In This Issue—*Getting Credit from the Banker*

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MOTOR AGE

Volume XXXVIII
Number 2

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JULY 8, 1920

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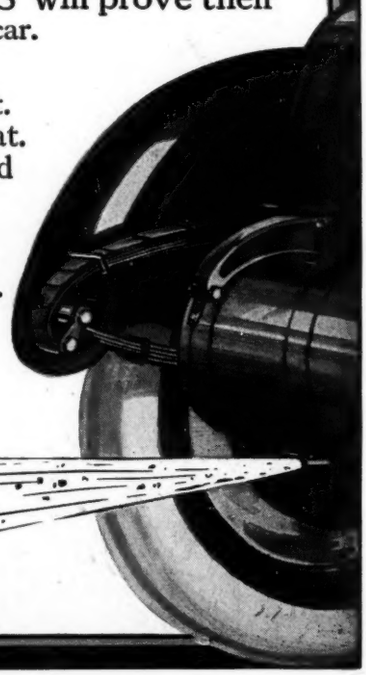

Out

MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANY

MALLERS BUILDING

59 East Madison Street, CHICAGO

HORACE M. SWETLAND, *Pres.* W. I. RALPH, *Vice-Pres.*
E. M. COREY, *Treas.* A. B. SWETLAND, *Gen. Mgr.*

Member Audit Bureau of Circulations; Member Assoc. Business Papers, Inc.

Vol. XXXVIII July 8, 1920 No. 2

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MOTOR AGE

MALLERS BUILDING
CHICAGO

Phone Randolph 6960
Cable Address "Motage"

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CLEVELAND, 536-540 Guardian Bldg., Main 6432
NEW YORK CITY, U. P. C. Bldg., 239 W. 39th St.
Phone Bryant 8760
PHILADELPHIA, Widener Bldg., Phone Locust 342-343

SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions	$ 5.00 per year
Canada	7.00 per year
All Other Countries in Postal Union	10.00 per year
Single Copies	35 cents

Make Checks Payable to Motor Age

Entered as second-class matter, September 19, 1899, at the Post Office, Chicago, Illinois, under Act of March 3, 1879.

Owned by UNITED PUBLISHERS CORPORATION, 239 W. 39th St., New York, H. W. Swetland, Pres.; Charles S. Phillips, Vice-Pres.; W. H. Taylor, Treas.; A. C. Pearson, Sec.

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Do you know that more than 50% of the valves used in American cars today have cast iron heads; that this type of valve in addition to being subject to pit, warp, leak and also subject to regrinding is liable to crack.

Do you know that the carbon steel valve head (pioneer construction) is subject to the four cardinal failings, that tungsten alloy heads (if they are high in tungsten) are not subject to pit, but are to burn—that they hold no virtue which protects the valve seat from erosion or destruction?

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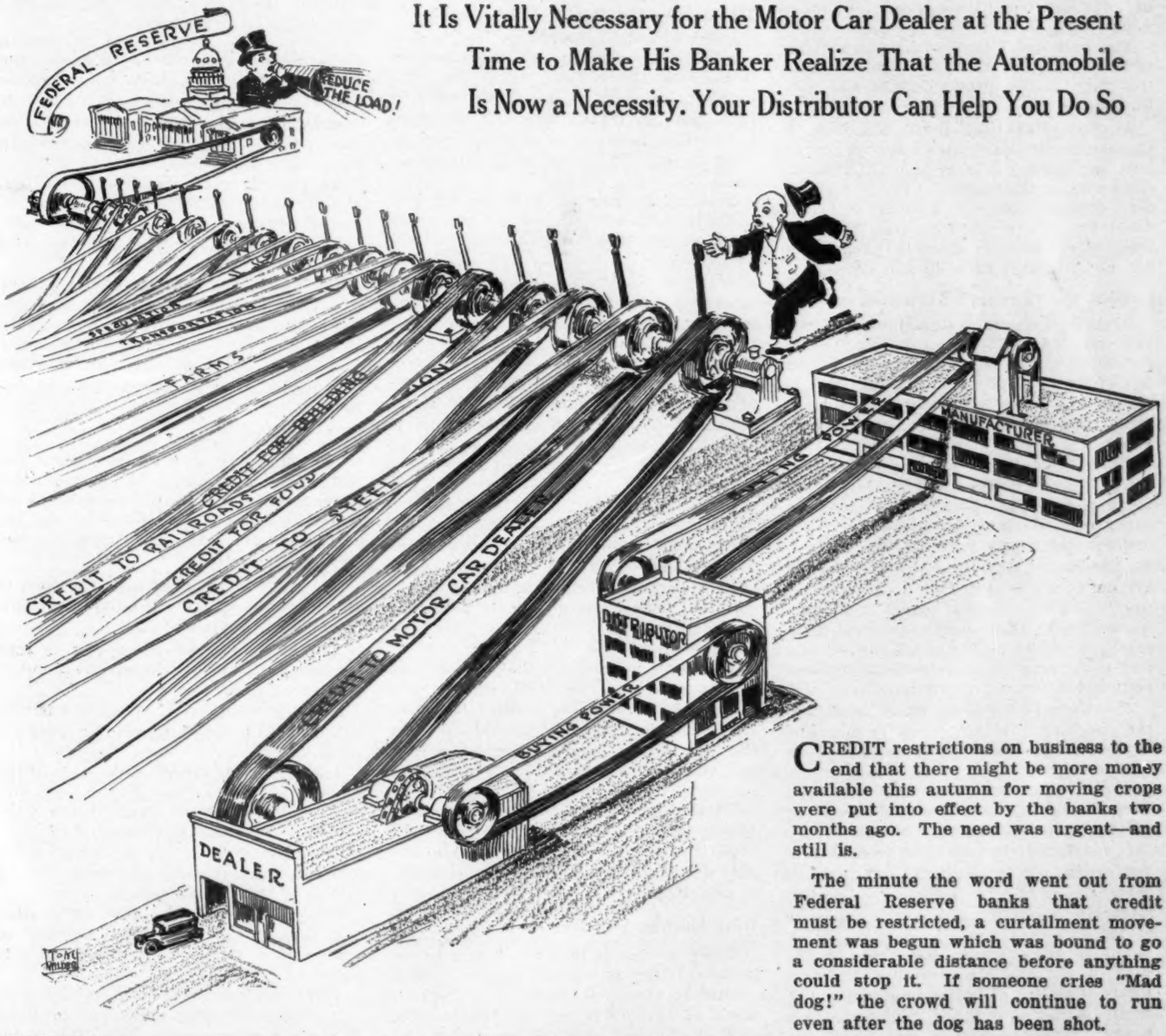
Vol. XXXVIII, No. 2 CHICAGO, July 8, 1920 $5.00 Per Year

MOTOR AGE

KEEP YOUR CREDIT CLUTCH IN!

It Is Vitally Necessary for the Motor Car Dealer at the Present Time to Make His Banker Realize That the Automobile Is Now a Necessity. Your Distributor Can Help You Do So



Motor Age has refrained from making editorial reference to the present credit situation as it effects the motor car dealer until it could have all the available facts in its possession. In the accompanying article the editors of Motor Age present the concrete facts of the credit crisis and have attempted to point out to their readers how they can best relieve themselves of undue restrictions.

CREDIT restrictions on business to the end that there might be more money available this autumn for moving crops were put into effect by the banks two months ago. The need was urgent—and still is.

The minute the word went out from Federal Reserve banks that credit must be restricted, a curtailment movement was begun which was bound to go a considerable distance before anything could stop it. If someone cries "Mad dog!" the crowd will continue to run even after the dog has been shot.

Therefore, when the bankers throughout the United States were advised to limit credit a limiting movement began which, it is reasonable to assume, would result in a curtailment for all purposes before it could or would be stopped.

Already business and credit have been restricted. A variety of causes, not the

least of which is curtailed credit, has caused a considerable check in motor car production. Some factories are to-day operating at 15 per cent off scheduled production, others 40 per cent off. The average production for the industry is about 75 per cent of the schedule.

Dealers, especially in sections remote from the factories, still feel the effect of the car shortage. Many of them have big stacks of orders yet unfilled. Railway transportation has been a factor in this shortage, but transportation has loosened up considerably within the last thirty to sixty days, and even the remote Pacific Coast is getting cars for its back orders. Strenuous efforts on the part of distributors have been necessary, but the trade has shown its inability in the face of adverse circumstances and is doing good work.

The cushion of back orders is proving of service at this time, because it is taking care of the production of the factories.

At the same time there has been a slackening in car sales, due in great part and particularly in some districts to the action of the bankers. In the Kansas City Federal Reserve district, where a decidedly adverse attitude was taken by the Federal Reserve officials, business is not good. Sales have slowed down.

Combat the "Luxury" Argument

In some sections dealers in some lines have notified their factories that they do not want any more cars right away, and numerous instances might be cited to show the manner in which the slackening of the flow of cars has been brought about.

Briefly, the situation is about like this: When it became necessary for the banker to restrict credit, he tried the plan on every one who asked for credit. When endeavoring to refuse the motor car dealer, the banker had the old and worn-out argument about the car being a "luxury." And in many cases the plan worked, with the result that some dealers have not been able to lift their drafts and cars have stood on sidings or been returned whence they came.

A curious phase of the situation is that the distributor, being a big city man and a capable business executive, has been able to get the luxury idea out of the banker's head and has generally been able to sell the banker on the necessity of the motor car. The result has been that most distributors have been able to get credit where justified, and in most cases the credit is justified. A similar situation holds true with the majority of the factories.

The pinch, however, has come in the case of the small dealer—and there is where the work of to-day is needed. The small dealer, compared with his own banker, is not as big a man as is the large town distributor. Perhaps he has not, in days gone by, heeded the advice of those who recommended that he play exceedingly close to the banker and stay with him all the time. Also, some of the credit which has affected the dealer's sales is that asked by customers who need motor cars on their farms and in their business. The banker, in many instances, knows the prospective buyer in the small town, and insists that he can get along without a car. The banker is right. We could all get along without cars, but if they were taken from us where would the country be in a week, and how long could our great nation continue its growth? The banker would be the last man to give up his car.

All these things combined have made it hard for the dealers in some of these smaller communities. They have been backed off the boards by the bankers. They have not felt capable of getting up on the same level with the money merchant and making him see that motor cars are used for things other than Sunday joy-riding.

The Aggressive Dealer Gets Credit

Furthermore, as long as the banker can continue to impose his credit restrictions with the motor car dealer with impunity he will do so. The man who furnishes the least opposition to credit restrictions is the man who will get the least credit. This has been proved already.

In some sections, the sales condition is bad. In others it is good. Where it is good, an eye should be kept on possible developments and where bad conditions prevail, an immediate effort should be made to right things.

Now here is the crux of the situation: It has been said that a curtailment of 10 per cent was all that would be needed. It further seems safe to assert that the minute the curtailment movement began it would reach 10 per cent before it could be stopped. And if it is not checked some place it is hard to tell how far it will go.

This industry has been far below 10 per cent off for a long time, and the curtailment among the dealers is at least that amount. Now is a time to make an effort to check the curtailment. If it can be checked now, that is sufficient evidence that the curtailment has gone far enough.

The prime necessity is that the bankers in the smaller cities and villages use discretion in curtailing credit. If a man should not buy a car he should not. But the "should not" ought to be determined on facts and not because the article of purchase is a motor car.

There is need for some real business assistance in the smaller cities and villages, in order that there may be no unjust discrimination against the products of this industry.

How Aid Can Be Given

The first step is for each dealer to get in close relations with his banker. There should be a mutual confidence. Perhaps some of the hitch between the banker and dealer and dealer's customer has been due to a lack of sufficiently close relationship.

In case the local dealer is not able to handle his local situation the distributor should give assistance, so far as possible. The distributor fills an important position in the industry, and today is one time when he can play a big part.

He should go out to the small dealer, go with him to the banker, clear the air of this "luxury" conversation, get down to facts and show the banker the truth of the situation. So far as can be learned, the banking authorities have no desire to limit credit where it is needed, and there is a possibility that some of the bankers may have a misunderstanding of the situation and may be going farther than even the Federal Reserve Board desires.

In some cases, distributors with ample assets may be able to deposit money in local banks for the purpose of facilitating credit arrangements.

Some distributors will be able to cooperate with the dealers by helping to handle paper. There are not a few distributors to-day who have for some time handled their own paper—and to their own financial advantage.

The factories also would do well to look into the question. By a close study of local conditions they may discover ways they can render assistance, by counsel or influence or otherwise. They should also study the country and ship judiciously when possible.

As regards trucks and tractors there should be hardly an objection from any one, yet there doubtless are bankers who consider anything run by gasoline as a "luxury."

During the war, the trade had to combat the "luxury" idea. Today, the same fight has to be waged all over again. The idea is false. It is due to misunderstanding. It is the trade's duty to sell the motor transportation idea to the country.

Talk to Your Banker

The only way that would forever end the misunderstanding is a test that never can be made. It would be to remove the motor car entirely from the life of the nation. Ask the banker to conceive the situation.

Ask the banker what would happen to his realty investments if motor transportation were elimnated.

Ask him what would happen to food production if the motor car were taken from the farms.

Ask him what would occur in business if the movements of individuals were restricted.

Ask him to set down on one side of the balance sheet the investments and production we have today and on the other side the transportation, method of business and mode of living of twenty years ago and see how long the former could endure if tied to the latter.

The principal progress of civilization has been in an increased rapidity of movement of human beings from place to place.

When civilization ceases to progress and it is no longer necessary for man to move from place to place, the motor vehicle will have become a non-essential and the efforts of bankers will not be necessary to stop sales.

Until that day comes—and it never will—the man who aids in building up and enlarging the motor car industry renders a service to the world and is a benefactor of his fellow men.

SOME ANGLES OF THE FUEL QUESTION

The Shortage Which Exists In Certain Sections of the Country Is Due to Local Conditions and Does Not Indicate a General Scarcity—So Keep On Selling Cars

By ROY E. BERG

THERE is no national fuel shortage. But!—we must conserve fuel. In the face of the evidence that some sections of the country are actually feeling the pangs of a fuel famine, a statement that no fuel shortage exists is hard to accept. It is not the failing of our natural fuel resources that has made our Western coast wince from the squeeze of shortage. There is a limited quantity of fuel being produced at the present time. In fact, to-day's production limits us to one and three-quarter gallons of gasoline per vehicle per day! So acute are the conditions.

We are not to interpret from this that production is going to steadily decline and leave us less than one and three-quarter gallons. The scarcity which exists in certain portions of the country is not a trend toward general prevalence. The man who hesitates on the purchase of a car on the grounds that gasoline will be too expensive, or soon will be limited only to commercial usage, has the wrong conception of the fuel resources of the country.

There are several factors that enter into the present fuel shortage problem. In these days, it is difficult to attach any significance to statements concerning the status of any business, unless the war is linked up with the situation in some way. But the war, undoubtedly, had a good deal to do with our present fuel shortage. Drilling operations during the war period were not as intensive as in pre-war days. Prospecting for new deposits, while not abandoned, was carried on with less activity than had been known in the oil fields for many years. This factor alone has made impossible any increase in crude production. In fact, this year the crude oil produced will be about the same produced last year. Together with the decreased activity in drilling operations, we have a demand just about twice that of a year ago. And there are several reasons why the demand should increase. First a million cars and trucks have been added to last year's seven million. Then we have $3,000,000,000 which formerly found an outlet in liquor consumption. This money will probably find enough sources for absorption and it is not improbable that the demand for exhilaration will be partly satiated by greater motoring activities.

To these reasons we must add one more which is highly important. The oil men themselves have underestimated the demand.

Power Evaporates When Stored

It should be remembered that gasoline is not a cold storage product; it does not rank with eggs, butter and cheese in this respect. Gasoline kept in storage soon becomes useless as a motor fuel. The volatile constituents evaporate very rapidly and leave behind the heavy portions of the gasoline. Without these lighter factions in the fuel, motor cars would be even more difficult to start than they now are. Also, the oil men have a reason of their own for not storing gasoline. Last year's gasoline production was 4,250,000,000 gal. The volatile constituents, which compose fifteen per cent of this, if evaporated, represent 6,375,000 gallons, which at twenty-five cents a gallon, represents a figure in itself.

Underestimating demand for a product that cannot be held in reserve, creates only one condition—temporary depletion. When the fields are again supplying, this acute condition will be relieved. But gasoline will, probably, never again be sold at less than a quarter a gallon.

Just as the application of science to engine design made possible great power and greater speed with the small 183-in. engine, so the application of science to our methods of refining will produce more gasoline from the crude. To-day, with latest refining methods, more than fifty per cent of the crude can be converted into gasoline. More and more refineries are using the cracking processes. Even though the production of crude does not increase, which is not likely, the quantity of gasoline will increase. Importation of crude from Mexico is increasing steadily, and with the domestic fields getting back into stride and setting even a faster pace, our production, supplemented by importation, makes the fuel shortage arguments appear as important as reports in the Congressional Record.

H. L. Dougherty is one of the big men in the oil world. His statements can not be discredited with an idle pshaw. In his opinion the two and three coming generations will have gasoline in sufficient quantity.

What possibilities does alcohol present as a cheaper fuel substitute? As a cheaper fuel, alcohol will suit the problem, but our engines must be redesigned. An engine burning alcohol produces about half the power of a similar sized gasoline engine. To produce the same power, we need an engine twice as large, which in itself is

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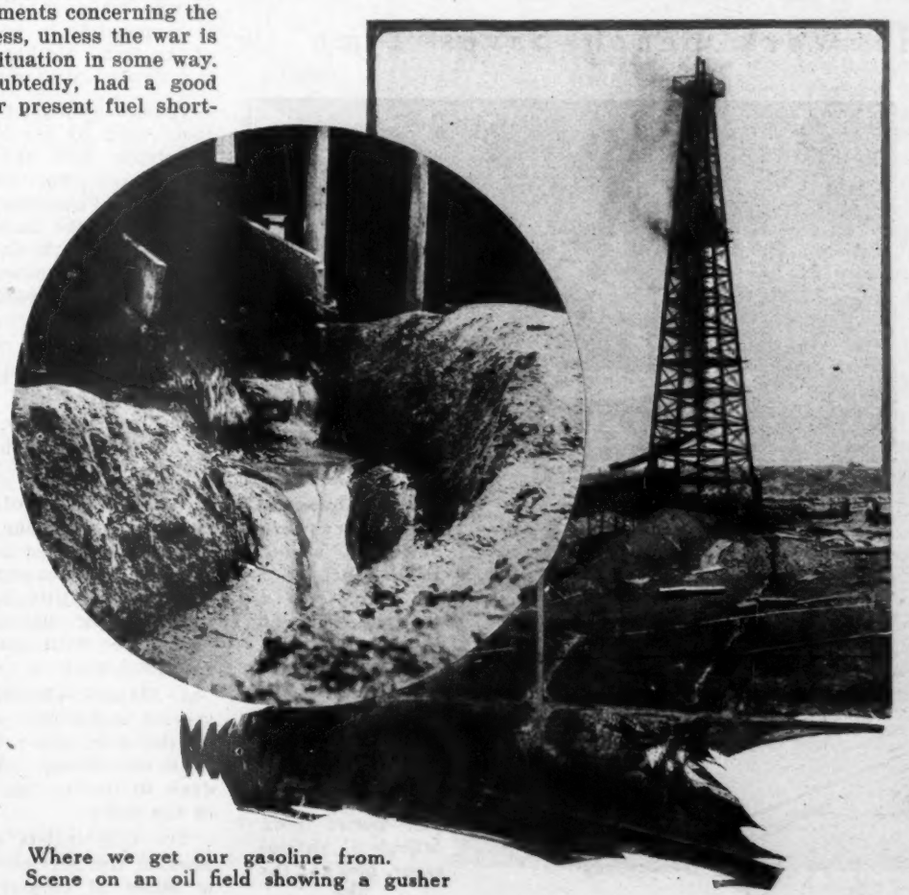


Where we get our gasoline from. Scene on an oil field showing a gusher

Keeping Your Men Interested in Their Work

Many Time and Labor Saving Devices Have Been Produced in the Service Station of Grieb & Thomas, Philadelphia, as a Result of Encouraging the Mechanics to Exercise Their Inventiveness

LABOR'S high cost is leaving its impression on various lines of business and the servicing of motor cars is no exception. Already some concerns are making sharp readjustments and others are gradually changing their methods to meet costs more readily.

While the price of many kinds of material has been advancing, it has not kept step, in all cases, with the demands of labor and this fact has given rise to the question, in numerous service stations, "Is it worth while tinkering with repair jobs, with labor asking its present rates, when actually better service could be given to the customer and no higher charge made by putting in, as a part of the system, entirely new parts?"

M. Clarke Grieb, of Grieb & Thomas, Inc., Philadelphia, can answer this question with an emphatic "No." This concern for a considerable period has followed out the plan of making new replacements wherever possible; has found it economical and more satisfactory to the customer and believes that many another firm would be justified in taking such a step, now that labor charges are in the ascendant.

Stimulating mechanics' interest in their work by encouraging them to make inventions, improve on stock tools and make combination adjustments of machines or tools that will facilitate their labors is a principle of conducting the service station of Grieb & Thomas, Inc., Philadelphia.

As a result, the men have produced many ingenious and helpful contrivances.

Absolute cleanliness is insisted upon in the service station proper and repairshop. Work is stopped for fifteen minutes daily, while the men,—most of whom are former service men in the army,—clean up about the place.

Sales and service are divorced as much as possible and the service manager has no mechanical duties whatever.

The firm distributes in the Philadelphia territory Briscoe, Grant and Renault passenger cars and Kissel trucks, and retails Curtiss airplanes. It is the original Briscoe distributor in America and is the largest, distributing not less than 2,200 cars yearly from Philadelphia.

"Especially when many models are handled, as in our case," says Mr. Grieb, "it pays to put in entirely new parts in most cases, on a servicing job, rather than have a car remain in the shop more than a week with the cost of labor as high as it is. Rarely, if ever, can a repair job be as good as a brand new part; such replacements can be made very quickly; the customer gets his car without delay, our shop is thus cleared up for the next job, our profits are more and the charge to the customer less than if we had to cover the labor charges of long repair jobs. Thus, both customer and firm are better satisfied in the end with our way of doing business."

The salesrooms of Grieb & Thomas, Inc., are removed by many blocks from the service station and this may be taken as typical of the separation of the departments of sales and service. The service manager, Charles R. Thompson, is responsible to no one but a member of the firm. He has no strictly mechanical duties—his foremen attend to those.

Thus, salesmen never are hampered in their work by service problems, nobody interferes with the service manager's duties and the work proceeds with despatch. Passenger cars and trucks are serviced in the same department. The service station is on the second floor of the service building. The ground floor is used for equipping and storing new and used vehicles.

A stock of from $25,000 to $50,000 in parts is always on hand, the firm maintaining that a part at hand is worth a dozen in the factory, as regards speed in accomplishment—which is the aim of service.

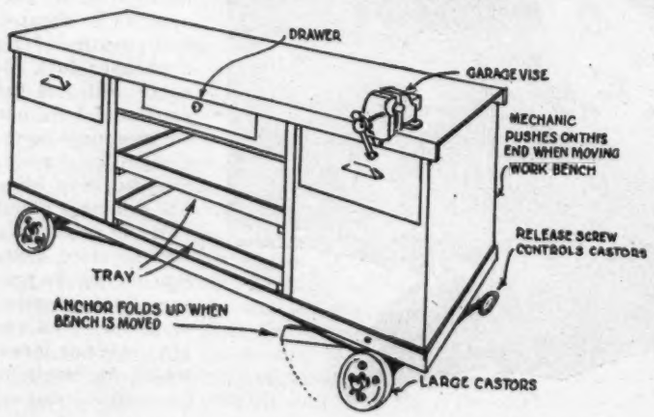
Another means of keeping such work as has to be done in the shop from being handicapped is the farming out, to reliable and expert machinists, such work as painting, radiator repairs and straightening chasses. This also is the procedure with battery and general electrical work on cars and trucks.

A blanket charge to customers for service and repair work is never made by the firm, the belief here being that injustice, though unintentional, will be done to one of the contracting parties in the end.

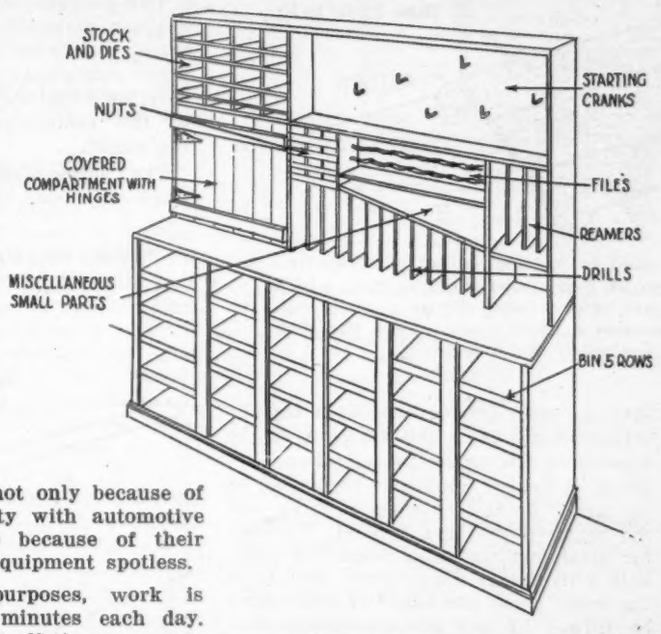
The firm insists on absolute cleanliness in the service station and a point is made of employing former service

Portable Work Bench Saves Time

This work bench is especially useful in the big shop. Eight of these are used by the mechanics in the service station of Grieb & Thomas, nc., Philadelphia. The shop is more than 200 ft. long, so having the benches portable is a great labor saver. There are stationary work benches, also. Each bench is 5 ft., 4 in. long, 2 ft. 8 in. high and the top is 20 in. wide. Tools go on top and in the cabinets on each and in the trays are kept a working outfit of cap screws, lock washers, cotter pins, fittings of various types, files and the like



Wall Case for Tools and Parts



Case with visible tools and parts in service manager's office at entrance to storeroom. It is 4 by 3 ft. and was built by the mechanics of the department. The case slants slightly toward the rear to make it easier to select tools and the whole surmounts five rows of bins of varying size

men as mechanics, not only because of their close familiarity with automotive mechanics, but also because of their drilling in keeping equipment spotless.

For "clean-up" purposes, work is stopped for fifteen minutes each day. The service station at all times presents a neat appearance, tools and parts are in place and there is nothing in the way for the unwary to stumble over.

This military precision is rather enjoyed by the former service men and does not seem as irksome as it might to the undrilled.

Portable Work Benches Save Time

The service station is a large one—220 ft. in depth by 60 ft. in front—and to save time and trouble in constantly having the workmen go to and from wall benches, a battery of eight portable work benches is used. Each of these benches is fully equipped with small tools, as if it were a regular wall bench, including vise. The benches, rolling on large castors, are 5 ft., 4 in. long, 2 ft,. 8 in. high and have tops 20 in. wide. The mechanics push their benches about as they go from car to car. Each bench has a partly enclosed tool cabinet. The sides of the bench are open part way and below the top is a tray in which a working outfit of cap screws, cotter pins, lock washers, files and various types of fittings kept handily.

A release screw in front, just above one of the castors, controls them like a brake and directly behind the castor having the release screw is a short wooden anchor which folds up—usually touched with the foot—when the bench is to be moved.

Ingenuity among the workmen is encouraged in every way and the results have been not only astonishing at times, but most useful. For instance: The mechanics, dissatisfied with the ordinary type of washing stand, or table for cleaning parts, invented and built their own.

This table, of the usual size and height, has a zinc-covered top, sloping gradually toward the center. There is a plug for letting out kerosene after washing, the dirt, of course, being drained out at the same time, through a pipe leading to a receptacle underneath. Here rear axles, transmissions and other parts are quickly and easily cleaned. The drain arrangement in the table keeps it clean and as soon as a job is finished, the table is ready for the next one.

Three compartments, on two sides of the stand, or table, are tray-like arrangements for scrapers and other small tools used in cleaning operations, as well as for laying in temporarily, small parts such as nuts and bolts, to be replaced after cleaning. The practice is to pour two gallons of kerosene on the parts to be cleaned.

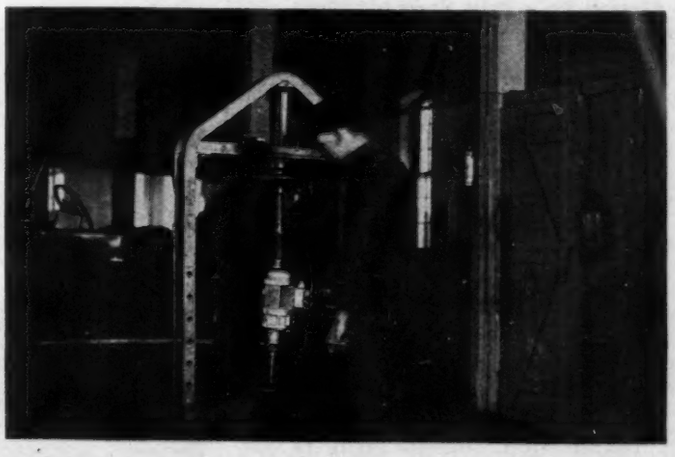
Devise Stand for Welding Tank

A further example of mechanical inventiveness is the construction, by the men, of a combination stand and truck for oxygen tanks.

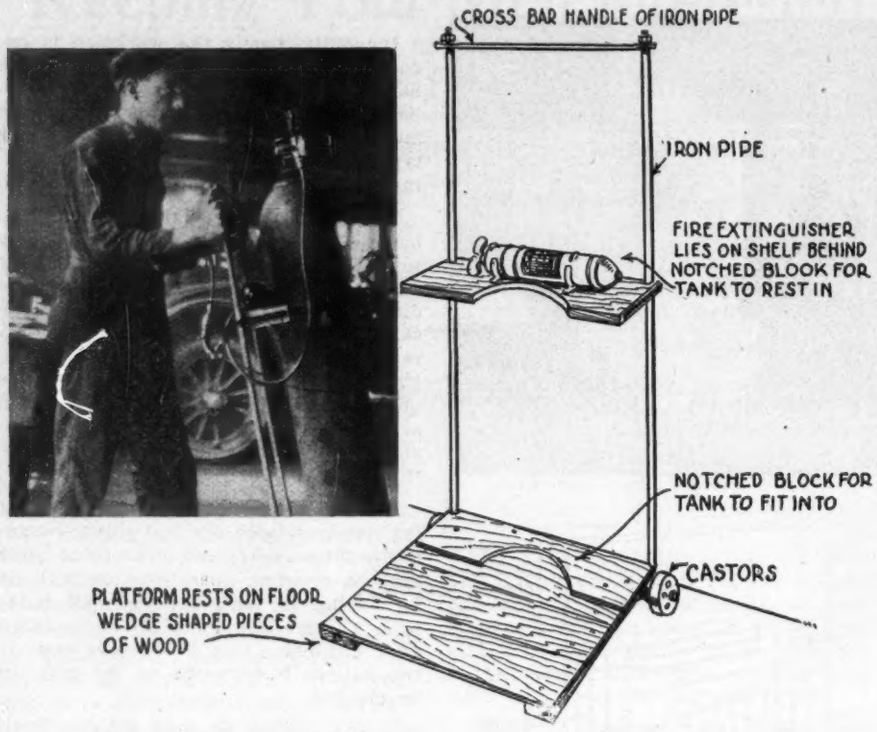
This convenient apparatus was made wholly out of scrap iron and wood picked up about the place. The frame of the stand-truck consists of two iron pipe uprights extending to waist-height; a cross-bar handle, also of iron pipe and an iron cross-bar about midway of the frame, equipped with slot brackets supporting a narrow wooden shelf, whereon is strapped a patent fire-extinguisher. This shelf, or block, is notched to let the oxygen tank fit in as closely as possible to the frame. The tank is strapped in place and the hose from the oxygen tank is coiled around the handle bar. A plat-

Heavy Drill Press, Effective Up to One Inch

Making a heavy drill press, effective up to 1 inch, out of a 20-ton arbor press and a light electric portable drill. Place on the heaviest portable drill in the shop — good up to 7/8 in. — a cap for straightening axles and fit it on the spindle of the arbor press. Then turn the wheel of arbor press and apply required pressure



Combination Stand and Truck for Oxygen Tank


CROSS BAR HANDLE OF IRON PIPE
IRON PIPE
FIRE EXTINGUISHER LIES ON SHELF BEHIND NOTCHED BLOCK FOR TANK TO REST IN
NOTCHED BLOCK FOR TANK TO FIT IN TO
CASTORS
PLATFORM RESTS ON FLOOR WEDGE SHAPED PIECES OF WOOD

This convenient apparatus was constructed by mechanics out of scrap iron and wood. In one of these views it is shown being used with the tank, which it renders easily portable and the manner of conveying the tank on its supports, which, by mere tilting, now becomes a hand truck. Note the shelf where a fire extinguisher lies ready for emergency

form, or the stand of the truck, slopes, from the castors at the bottom of the frame in the rear, or toward the operator, to the floor, and wedge-shaped side pieces of wood underneath the platform, supply the rests when the truck is not in motion.

To move the truck, the operator merely has to tilt the iron pipe handles back toward himself, after manner of starting the usual hand-truck that has been up-ended. The tank used with this home-made outfit holds 220 cu. ft. of oxygen, and the whole apparatus is easily portable and always safe because of the accompanying fire extinguisher which is always fastened in place.

Rigging Up a Drill Press

Ingenuity is again shown in the manner of combining tools in this service station. On account of the elimination of repair work, so far as practicable, few heavy pieces of apparatus, or machines, are used. Portable electric drills are employed and it was found by the mechanics that a heavy drill press could be rigged out of one of the light portable drills used in connection with a twenty-ton arbor press used largely for prying off gears.

This adjustment is not often required, but comes in handy at times and the drill is effective up to one inch. The procedure is as follows:

The heaviest portable drill in the place, good up to seven-eighths of an inch, is used, placing thereon a cap for straightening axles and fitting it on the spindle of the arbor press, which is a Black & Decker machine. The wheel of the arbor press is turned by hand and the required pressure applied. The cap for straightening axles keeps the portable drill tightly fitted to the spindle of the arbor press, the wheel of which may be turned by the jack-like mechanism accompanying it, which device considerably tightens the squeeze.

The mechanics built their wallcase for tools and small parts, which is placed on a rack in the office of Mr. Thompson, who is thus able to check up personally, or through an assistant, any parts or tools removed. The wall case is 3 by 4 feet, slants slightly toward the rear, after the manner of a proofreader's desk, making selection of contents easier, and is equipped with special compartments for such articles as stocks and dies, starting cranks, files of many sizes, reamers, drills, nuts and bolts. There is one covered compartment on hinges for the smallest articles. This case surmounts five rows of bins for parts, of varying size, the bins numbering five high, as well as five across.

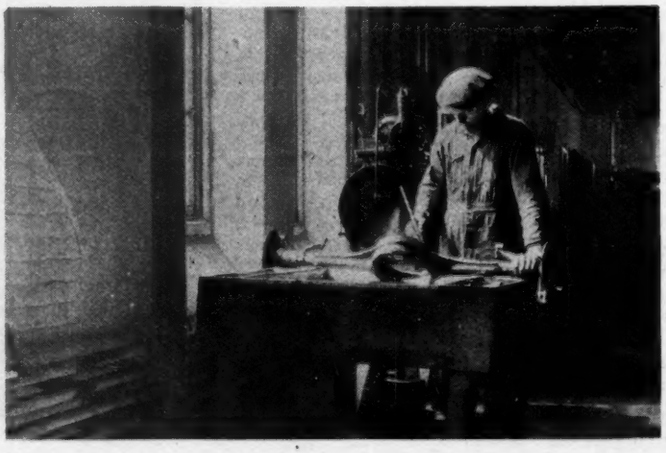
Kerosene Blow Forge

Once more: A "home-made" kerosene blow forge, fashioned from old bricks, scrap sheet zinc and iron pipes and connected with the Houck air compressor by piping running all the way across the garage, over walls and ceiling. The forge, put to the usual service station uses, is assembled on a wall bench.

Two portable cranes with chain hoists, a stock make of engine stand, two or three carbon-burning outfits and wall bench equipment, much like that on the portable workbenches, comprise the bulk of the remainder of the mechanical equipment.

The service car, a one-ton Kissel truck with open express body and pneu-

Shop cleaning table-tub, made by mechanics of Grieb & Thomas, Inc. Top, covered with zinc, slopes gradually toward center, in which is a plug for letting out kerosene and dirt from transmissions, rear axles and other parts cleaned. On two sides are tray-like arrangements for scrapers, other small tools and small parts. The practice is to pour two gallons of kerosene on the parts to be cleaned



matic tires, carries back of the cab a tool and emergency parts box about the size of an ordinary trunk. An automobile ambulance is featured in this emergency outfit and is disassembled and rigged up to be carried in a distinctive way such as is done nowhere else in Philadelphia.

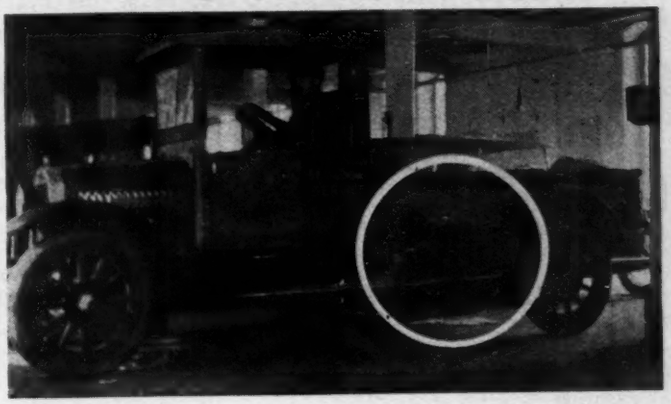
The wheel part of the automobile ambulance is placed on the running board of the service car, in front of the mudguard of the left rear wheel, where it is out of the way. There it is safely clamped with a pair of old battery hooks, fastened to the underside of the running board. The pole part of the ambulance is laid across a pair of special, large hooks, fore and aft, on the side of the car, below the flange of the body top, just fitting snugly. On the opposite side, balancing the ambulance pole, are two long, wooden, steel-capped poles, for prying, fastened by hooks in similar manner.

In addition, the truck carries a chain hoist, ropes, jacks and extra front and rear wheels.

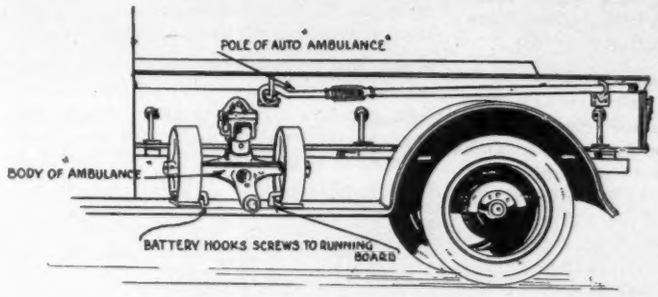
Some Handy Tools Made

Sometimes the mechanics try their hand at making tools especially applicable to their work. Once in a while the idea may be entirely original, while now and then it may be just a new kink added to an old invention. Not infrequently such a "home-made" tool may be contrived out of waste bits. Witness a device for pressing down valve and clutch springs to remove spring locks. One of the mechanics fashioned this device out of a half of an old spring leaf. The curved end, opposite an end having a notch to fit over a horseshoe lock, and a hook with a threaded stem, is used as a handle. The leaf has holes bored at short distances apart for inserting the hook at different portions of the contrivance. This hook is kept in place after insertion through the desired hole in the leaf, by means of a nut above the leaf and another below. The curve of the handle gives good leverage in pressing down to release springs.

Carrying the Auto Ambulance on the Service Truck



Grieb & Thomas service car. This was assembled by the mechanics for the special purpose. It is a one-ton Kissel truck, but its original manufacturer would hardly know it. The cab is from another truck and the open express body is equipped with a large, trunk-like tool and extra part



case. Note how the auto ambulance is disassembled and carried, the wheel part on the running board, where it is clamped with a pair of battery hooks placed beneath, while the pole part is laid on hooks where the top of the body has its outward flange

Notes On Repair Shop Efficiency

By H. C. FITCH

Director of Service, Willys-Overland, Inc.

1—When a dealer sells a car to an owner, he should give the purchaser complete instructions, not only how to drive his car, but also how to keep his car running properly.

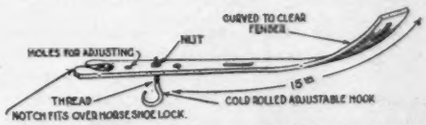
2—In past years, our books have attempted to say too much and have instructed too little. They have been compendiums of gas engine science and theory; too abstruse for the average layman; or else have been bulky repair manuals, giving instructions for intricate operations that required the knowledge of an expert mechanic and a garage full of special tools for their performance.

3—If an owner drives up to a dealer's establishment with a cylinder missing fire and tells the dealer to overhaul the engine, when all that is required is a new spark plug, we want that dealer or his mechanic to show the owner what is wrong and how to replace that spark plug, and thus save himself needless repair bills.

4—Customers should be waited upon properly, courteously and in turn, as they enter the service station. The order taker must appreciate the value of a customer and his good will in the expansion of the dealer's business.

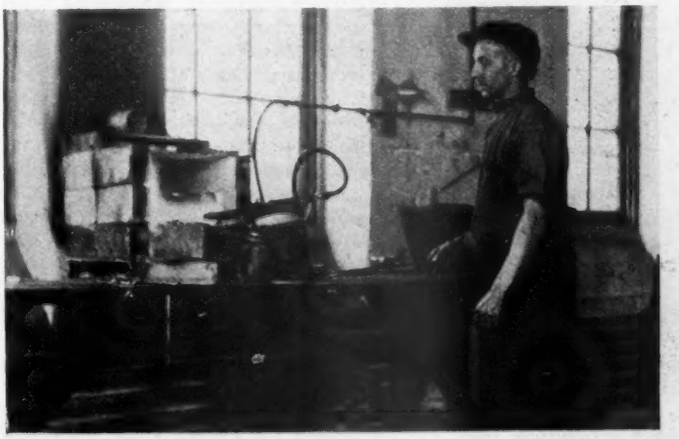
5—The repair order should be written up clearly and distinctly. The first important step should be to get the customer's name, address and telephone number correctly. If he does not have a telephone, arrange to get in touch with him, should additional instructions with the repair job in process be required.

6—The order taker should never promise the impossible, nor take a chance on the job being ready at a certain time.



Original tool made from half a spring leaf by mechanics of Grieb & Thomas, Inc., Philadelphia. This shop-made device is used for pressing down valve and clutch springs to remove valve spring locks. The curved end, opposite the notch and threaded hook, is employed as the handle

Kerosene Blow Forge



Operating the kerosene blow-forge in the Grieb & Thomas service station. This handy apparatus, assembled on one of the stationary work benches, out of bricks, sheet zinc and iron pipes, is connected with the big air compressor, located across the service station, by means of piping. The forge was made by the mechanics

Where Can I Get A Good Electrical Man?

The Above Is a Question Confronting Most Automobile Dealers and One Which Is Being Largely Answered by a Chicago School Devoted Exclusively to Electric Subjects as Related to the Industry

BECAUSE of the steadily growing number of motor cars, trucks, tractors, airplanes and other automotive apparatus, the demand for electrically trained service men daily is becoming greater. It is quite generally known that the most service work on automotive apparatus centers about the electric system, not because the electric systems on the market to-day are not well designed and built, but because car owners and other users of gasoline vehicles know least about such systems, and, therefore, have to seek the service station.

At the service stations we find much the same situation. The average mechanic, while he may know considerable about bearings, pistons and axles, does not know the ins and outs of making the electric systems function when they are out of adjustment. To be a successful electric trouble chaser and repairman the mechanic must possess a certain knowledge of the fundamentals of electricity, coupled with the ability to make the necessary repairs intelligently.

Realizing the above conditions, the American Bureau of Engineering of Chicago, some time ago, started a school, the Ambu Engineering Institute, which has become one of the foremost schools of its kind in the country. A representative of MOTOR AGE recently spent much time at this school and was impressed with the thoroughness in which the various branches of automotive electricity is taken up. Fundamental electricity, starting and lighting, ignition and storage batteries are the subjects taught. The course requires eight weeks. It is essential, of course, that the student possess an average education and average ability.

Division of Course

The eight-weeks' course is divided into four distinct parts, each of two weeks' duration. The first two weeks are devoted to a thorough study of the fundamentals of electrical engineering. A great deal of stress is placed upon the importance of the student obtaining a very thorough and practical understanding of the fundamental principles of the electric and magnetic circuits, in order that he may readily grasp their application in the construction and operation of the electrical equipment on the modern motor car.

The second two weeks is devoted to a study of electrical systems. The fundamental principles of the generator, motor, cut-out, regulator, etc., are discussed in detail and the student is given an opportunity to acquaint himself with all of the many different types and makes of electrical systems. Particular attention is given to a thorough and systematic method of locating electrical trouble by applying the fundamental principles of the electrical circuit.

The third two weeks is devoted to a study of the fundamental principles of ignition and their applications as found in the various magneto and battery ignition systems. Particular attention is given to the systematic location of ignition troubles and their remedy.

The fourth two weeks is devoted to the storage battery, its construction, inspection, repair and maintenance. Each student is expected to make the necessary repairs in a number of storage batteries and to carry them through all of the different stages of their reconstruction. Several inspection visits are made by each class as a body to battery stations and factories in Chicago.

Method of Instruction

The members of each class are divided into groups of two men each and each of these groups is assigned to a particular bench where they perform all of their experimental work. Each work bench has an enclosed compartment beneath it which contains all of the necessary equipment for the students in each group to carry on their experimental work. Each student is held responsible for all the equipment assigned to him.

The building of the Ambu Engineering Institute, Chicago, where automotive electricity is taught

Each school day is divided into two periods of four hours each, except Saturday, on which there is only one four-hour period. At the beginning of each period the students are assigned a "job" and they are supplied with detailed printed instructions as to how to proceed to carry on the experimental work. Attention is called by the instructor to any special precautions to be observed in carrying out the work as outlined in the "job" and any points or features which may demand special attention on account of their importance. At the close of the day's work the students are provided with a list of questions which bear directly on the "jobs" performed during the day. These questions are studied by the students and they write down on a separate sheet of paper what they consider to be the correct answers.

At the opening of school on the following day the instructor goes over the list of questions very carefully and discusses them with the entire class and each student is given an opportunity to verify his answers. The students are then expected to write the correct answers in the blank spaces on the question sheets.

There are approximately 1600 questions in the entire course and approximately 80 "jobs." These questions and experimental results obtained in performing the "jobs," when properly filled in by the student, constitute a very complete text to automotive electricity. This book is very valuable to the graduate in his future work for reference.

Special Lectures

Special lectures are given at the institute each Saturday afternoon dealing with such subjects as "Cost Accounting," "Shop Layout," "Business Management," Storage Batteries and Their Manufacture," etc. The object of these lectures is to broaden the student's mind and give him advantage of the practical experience of men who are actively engaged in work along the lines that the student is studying. The lectures are given by representatives of various battery and equipment makers.

The school hours are from 8:00 a. m. to 4:30 p. m., with three-quarters of an hour for luncheon, except on Saturday, when the hours are from 8:00 a. m. to noon. Classes start every other week, and continue throughout the year.

Pictures Taken in the Ambu Engineering Institute

On the left is the class in starting and lighting and on the right, the class in fundamental electricity. Blackboards are made use of to illustrate theory and to make clear the problems envolved in motor car electric systems

The lecture room, on the left, in which frequent talks are given to the students, on various phases of the automotive electric business. The library, on the right, contains reference books and is used by students as a study room

The battery department, on the left, is in charge of a veteran service station man, and is one of the best equipped departments of the school. The other view shows the complete equipment used by the students in work pertaining to ignition

Automobile Publicity Which Can Be Made Real News

Maintenance and Operation Suggestions, Hints Which Will Make for Greater Economy for the Car Owner and Touring Information Are Eagerly Sought for by Most Newspapers

BY LAMBERT G. SULLIVAN

In this, the second of two articles on automobile publicity, the writer has sought to offer some really constructive suggestions on how automobile publicity may be improved. The suggestions offered are not original with the writer; he makes no such claim. The sort of publicity mentioned here has been tried by various automobile and equipment manufacturers and proved itself beneficial. It is discussed here because the writer believes that if this sort of news is called to the attention of the dealers of the United States, those dealers will have greater influencing in shaping the automobile publicity of the future along lines which will prove of real benefit to themselves, their factories and to the industry as a whole.

"WHAT sort of publicity can the automobile dealer or the automobile manufacturer send to newspapers which will be acceptable?"

That is the natural query one asks after being informed that the sort of guff and puff which always has been known as automobile publicity will no longer be tolerated by newspapers. And, Yankee-like, the answer is another question, the question the newspaper automobile editor has to ask himself when he tries to build up an automobile section. It is:

"What does the automobile owner and automobile user want to know about automobiles?"

When I was an automobile editor I asked that question and I found that the automobile owner was interested along the following lines:

First: How he could get the best service out of his car under all conditions; how he could run his car with the greatest pleasure and comfort to himself and with the least annoyance and bother.

Second: How he could run his car most economically.

Third: Where he could go with his car.

Fourth: What new developments and inventions there were in automobiles and automotive equipment; what new cars were appearing in his cities; whether the dealer from whom he bought his car was still in business or whether the agency had changed hands.

Little Interest in Dealer

There are four things the automobile owner is interested in, but he is by no means equally interested in all four of them. He is, perhaps, equally interested in the first three, but the automobile editor could almost leave the fourth out of his consideration. It may not be particularly flattering, but it is the truth that only in exceptional cases does a car owner care a tinker's dam whether the man who sold him his car is making a million dollars a week or going broke. And in these exceptional cases you don't have to worry about keeping your friends informed through newspaper columns. They'll know anyway.

Obviously, if automobile publicity is going to be reformed along legitimate lines, it must be along the lines of the things which interest automobile owners. If you can give something to a newspaper which will bring the newspaper circulation, you don't have to worry about "gentlemen's agreements" to bar publicity. Every newspaper is after features which will attract readers. Newspapers don't print columns of baseball because of any great love for the game—they print them because their public demands that news.

Maintenance Is Always Interesting

Let us take up the first of the four things the automobile owner is interested in and see how the manufacturer and dealer can co-operate in getting publicity for their industry and incidentally for themselves, along these lines. The first of the four, boiled down, is simply operation and maintenance.

Of course the instruction book issued by the factory and the individual instruction imparted by the dealer are the first answer to this want on the part of the motorist. But why let so promising a lead for publicity drop with this simple answer? Every manufacturer, every dealer knows that hundreds of things come up in regard to cars which are not answered by simple reference to the instruction book. The Readers' Clearing House department of MOTOR AGE which receives on an average of more than 50 inquiries a week from dealers alone proves this.

Don't make the mistake of believing that the automobile owner of to-day needs less instruction than the automobile owner of the early days of the industry. A great many manufacturers and dealers believe that the average automobilist of to-day is fairly well educated along the lines of operating his car. They look upon him as a man who at least knows the A B C's of operation and maintenance.

In a measure that may be true. There are thousands of automobilists who have owned and driven cars for several years and who are reasonably well acquainted with their care and operation, but how about the hundreds of thousands of persons who are owning and driving their first car—the scores of thousands who know absolutely nothing about cars except how to drive them when they are in good condition?

Bear in mind that John Henry Jones may have owned a car for ten years and knows how to take pretty good care of it. But remember that it is only in the last two or three years that Mrs. John Henry Jones has started to drive the car herself. And perhaps John Henry Jones, Jr., is about fifteen years old now and is beginning to take an intelligent interest in the car other than just riding in it. John Henry may not read any of the kindergarten maintenance hints the local newspaper prints but you can rest assured that Mrs. John Henry and John Henry, Jr., are just going to eat them up. And in our great American family life don't forget that Mrs. John Henry and John Henry, Jr., have more to say about the new car John Henry, Sr., buys than he has himself.

Don't make the mistake of attempting to give too technical hints through newspaper columns. In the first place, it's ten to one the automobile editor himself won't understand technical language and will throw the stuff in the waste-basket. Newspapers are run on the principle that you can't make a thing too simple to be understood. That's why they print pictures, and diagrams with X marking the spot where the murder was committed.

Dealers Can Help in Work

The major part of this sort of publicity should, of course, come from the factory. The factory knows, or at least should know, more about the care required to get best results from its car than even the best of its dealers. And the factory shouldn't try to get its name in every line of publicity it sends out. If it can get a "courtesy line" such as "These hints were furnished by the service department of the Podunk company" it will do more good than eight columns of guff signed by Hiram J. Podunk, grand president of the Podunk Motor Car Corp. regarding the effects of prohibition on our relations with the Island of Yap.

But the dealer needn't feel himself left out in the cold. The factory can, at best, go at its publicity in a general way. It can deal only with problems of nation-wide recurrence. Because of its very extensive field it cannot take up problems distinctly local. Here is where the

dealer has his inning. He can supplement his factory's publicity with his own. Perhaps the factory may send out maintenance hints which may be perfectly good for nine-tenths of the United States but are absolutely useless for his locality. Let him stop such useless publicity and substitute his own helpful publicity. Both he and his factory will be the gainers.

Economy a Coming Question

And in another way the dealer can supplement factory publicity. That is by giving hints on the care and operation of old cars. The factory naturally is going to confine itself very largely to the care of its latest models. It would be too much to expect, for instance, for the Podunk factory to send out publicity along the lines that the carbureter with which its 1914 model is equipped is far out of date at present. But the dealer can do that and not only will he solve the perplexities of many owners but he probably will pave the way to the sale of a new model carbureter.

"How can I run my car most economically?"

Perhaps that question is a little out of date at the present time; at least for the last couple of years it has seemed distinctly bourgeois to take any accounting of cost. But it isn't going to be that way for many weeks longer. Wait until gasoline is 34 cents a gallon, as it is in places and seems it may soon be in many more, and you'll hear a lot of automobile owners going back to the old economy question.

This, unquestionably, is the big opportunity for the dealer with his local news items and hints. A great many manufacturers take the stand that their cars are what might be termed "universally adjusted," that is, that they are adjusted at the factory to give the best and most economical service no matter in what locality or in what climate they are operated. And such factories aren't likely to send out publicity along the lines of adjustment for economy.

The dealer, however, knows that the factory is wrong in this. He knows that while the car may be adjusted for most places, it needs a slight adjustment to make it most economical in his particular locality. And he can make a lot of friends and can get by with some publicity in the newspaper if he will only tell what to do.

Will Welcome Local Publicity

That brings up, of course, the question of seasonal hints. What is best for the car in winter isn't always good for it in summer. And what will make the car run better and cheaper in summer won't make it do that in winter. The factory can't take care of this seasonal publicity because its same publicity goes out to papers in Miami, Florida, and to Medicine Hat, Alberta. It is almost impossible for a manufacturer to localize factory publicity; that business is strictly up to the dealer.

Newspapers will be glad to get that sort of publicity. They realize that automobile owners want to know how to operate and care for their cars as comfortably and cheaply as possible. They realize that if one paper in the city is going to print a mass of really helpful information along this subject it will get all of the automobile readers in the city. And the paper which has the majority of automobile readers has a legitimate claim on which to sell advertising.

You won't have to worry about gentlemen's agreements among newspapers to bar automobile news if you make your publicity along these lines. The papers, far from barring news of this sort, are on the lookout for it. Perhaps, for a while, they may refuse to mention car names, but don't worry about that. If you are helping the automobile industry as a whole, you are helping yourself. And gradually you are going to break down the silly barrier against car names. If a newspaper knows that it has 500 Podunk owners who are going to be interested in real news about Podunk cars, it will use that name to attract those 500 readers. But the newspaper realizes now that its 500 Podunk readers aren't in the slightest interested in what President Podunk thinks about this, that or the other thing.

Touring Information Always Timely

"Where can I go with my car?"

There's the chance of both manufacturer and dealer to cash in on real publicity. Perhaps it may be indirect publicity in which the name of the company which furnishes it won't appear at all, but nevertheless it is publicity of inestimable benefit to the industry and to the individual company or dealer which gives it to the paper.

For newspapers want this sort of news. Wide-awake newspapers throughout the United States are going more and more extensively into the field of touring information. Once they were content to give a weekly map; then they supplemented these maps with road directions; now they are beginning to supplement the whole with weekly or even daily bulletins telling of the principal roads in their vicinity.

It has always been a source of wonderment to me that the National Automobile Chamber of Commerce or some other body never went into the touring situation. By combining the resources of the automobile manufacturers of the United States into a road bureau it could have an establishment which would be of inestimable value to the automobile industry. Perhaps that is outside the province of the N. A. C. C., but the N. A. C. C. has undertaken other propaganda work and it has always seemed to me that giving touring information is about the most valuable propaganda that the automobile business can do.

I will give just a little example of how it all works out. When I started editing an automobile section, I decided to run a weekly tour. I looked around for some place to obtain it and finally made arrangements with a big tire concern which maintains a national touring bureau, to furnish me with it. The tire company did not even ask me to run a courtesy or copyright line under the maps with which it furnished me.

At first I thought that was a mistake, but it wasn't long before I found that the tire company knew just what it was doing. It took only a few weeks for the automobilists of Chicago to learn that The Daily News was running touring information every Saturday, and soon I began to get inquiries for more information.

How Touring News Works Out

Of course I did not have the information at hand—would have been far too busy to answer all inquiries and telephone calls even if I did have it—so instead of answering the questions I would just tell telephone inquirers that my information was all furnished by the Goodrich Tire company and that that company would be very glad to give them all information they wished. Inquiring letters I merely forwarded to the tire company and let the company answer them on its own stationery. From June to October I averaged better than ten telephone calls and ten letters a day referred to the tire company. Did that sort of publicity pay the Goodrich company?

Nor was this all. My confreres on other newspapers used to tell me that they received numerous inquiries for touring information and that it was almost impossible for them to answer them. "Why not refer them to the Goodrich company," I would ask, and nine times out of ten they would accept the suggestion. Now I don't know to this day whether Goodrich was a particularly good advertiser in The Daily News and don't care particularly. I knew that the company was giving me something in the way of automobile news that I wanted and was valuable to me, and it was only natural for me to reciprocate.

It has always seemed to me that automobile manufacturers were letting a gold mine of publicity lie unworked under their feet in this touring situation, but they have been so busy sending out the guff which has brought on the present attitude of newspapers to bar all publicity that they have not seen it.

Dealers May Localize This News

Of course the best the factory could do in this sort of work would be to give touring information of national character. They could, at best, outline only transcontinental routes and tours between the larger cities and the demand for this sort of information would be distinctly limited. But if they supplemented their occasional "tours" with weekly bulletins giving the general condition of the roads on those routes, they would find the newspapers very ready to accept them and print them. Perhaps a national touring bureau such as the one maintained by the Goodrich company might be a trifle too expensive for most manufacturers, but they could at least do something along touring information publicity lines.

The dealer can also use this sort of publicity, perhaps even better than the manufacturer. For the dealer is so situated that he can give much more recent

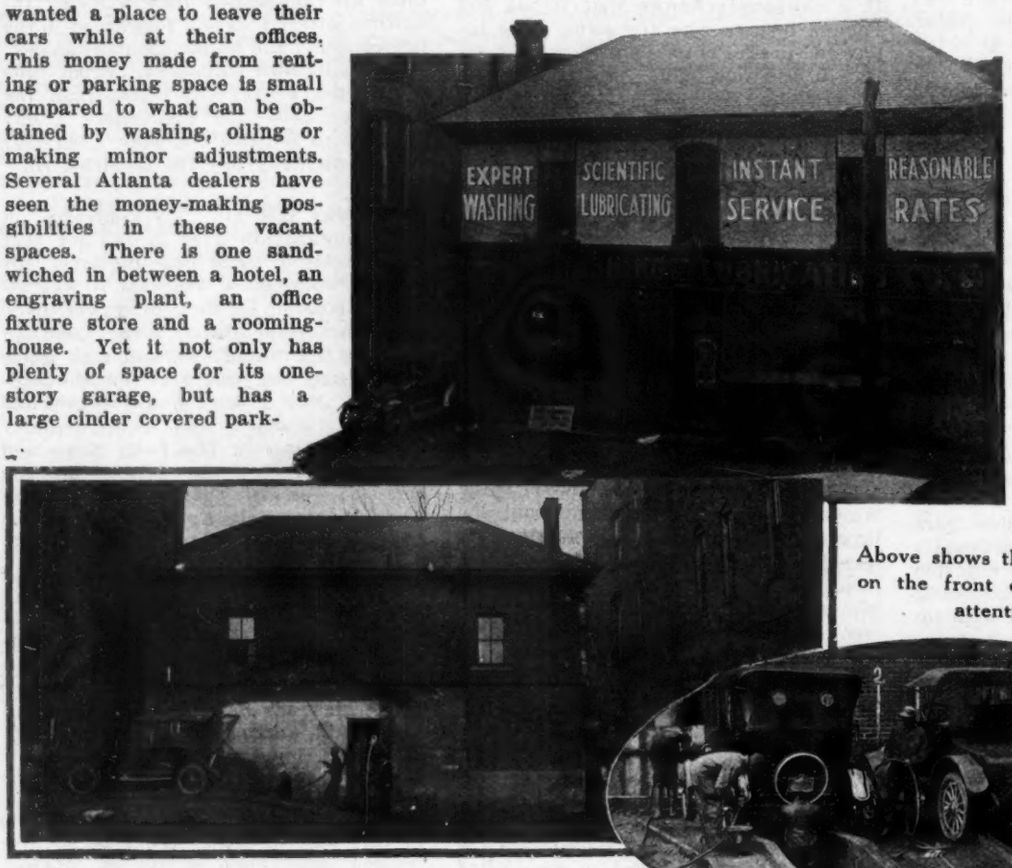
(*Concluded on page 52*)

There's Money Right in Your Back Yard

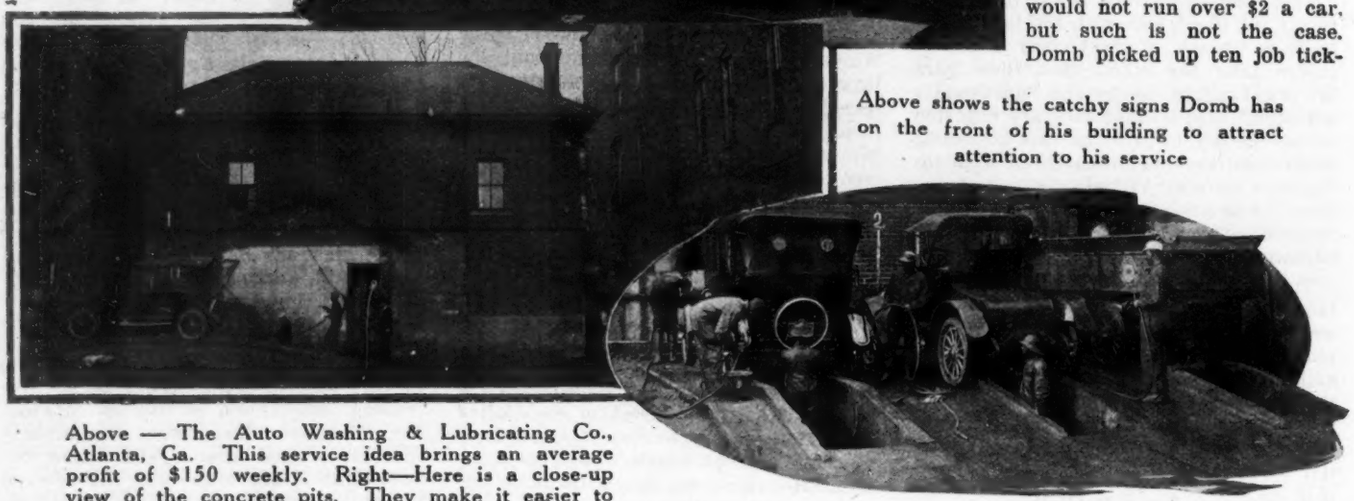
How Profits Can Be Had From the Vacant Space in the Rear of Your Building or Nearby

ALMOST every garage or service station has a vacant space in the rear of the building that can be made to pay a profit at a small outlay of expense.

When the spaces for parking in streets became more and more scarce in Atlanta, progressive dealers took these vacant areas in the rear of their buildings or leased other spaces they knew of, graded and leveled them and then rented this space to car owners who wanted a place to leave their cars while at their offices. This money made from renting or parking space is small compared to what can be obtained by washing, oiling or making minor adjustments. Several Atlanta dealers have seen the money-making possibilities in these vacant spaces. There is one sandwiched in between a hotel, an engraving plant, an office fixture store and a rooming-house. Yet it not only has plenty of space for its one-story garage, but has a large cinder covered parking space in front, while the alley running through the block gives entrance from two streets.



Above shows the catchy signs Domb has on the front of his building to attract attention to his service



Above — The Auto Washing & Lubricating Co., Atlanta, Ga. This service idea brings an average profit of $150 weekly. Right—Here is a close-up view of the concrete pits. They make it easier to wash and lubricate the underside of cars

The Auto Washery is the unique name of another specialized service company, which has made use of an old, ramshackle building, surrounded by stately and modern office buildings, for its washing plant and the yard for storage.

Perhaps the best example of the use of dead space and an absolute building is found in the history of the Auto Washing and Lubricating Co.

S. L. Domb, in casting about for a good investment of a small capital, saw possibilities in an old boarding house. This was located between the modern building of the Atlanta Athletic Club and an automobile showroom.

With approximately $1200 cash capital Domb went to work. He had an old building on his hands to be worked over into a habitable office and storeroom, and a blank space, 90 by 200 ft., to be graded and leveled. With an outlay of about $75 he had the front and back porches torn away and made the necessary indoor repairs. It took $150 to plaster the front with attractive, catchy signs and paint the building. Thirty dollars were spent in buying cinders for the front and back yards, and $800 was used in constructing three concrete washing pits. The latter are worthy of special mention. The usual place for carrying off the water was not only provided but holes were dug deep enough and lined with concrete to allow the workmen to stand up while washing the car or working from beneath it. As Domb had already hired his washers he began doing business even before the pits were dug. During their spare time he kept them busy spreading the cinders and grading the yards until the place was in excellent shape. About $100 was spent in this work. And there is just one more item of the initial expense. It was the first month's rent. That was $50 and lately he has leased the property for two more years at a slight increase in the rental.

And now the results. Domb has a scale of prices. For washing the ordinary touring car, $1.50; sedans or coupes, $2; turning and filling grease cups, 50 cents; draining and cleaning the crankcase, transmission, differential and universal joints, for the price of the grease and oil, approximately $3; an oil bath to remove squeaks and rattles, $1.50; scouring and cleaning the upholstery and applying a coat of top-dressing, $2.50; wire wheels washed with kerosene, 50 cents extra.

Off hand it would be imagined that the average job would not run over $2 a car, but such is not the case. Domb picked up ten job tickets at random from his desk and we found upon averaging them that the amount ran about $3. It was found that his firm was able to render service to one car that would amount to $12 or more. So an average of $3 is conservative enough.

It averages about one hundred and fifty cars per week and at $3 each this brings the weekly income up to $450. The weekly expenses including the payroll, rent, manager's and assistant's salaries and the office expenses total about $300. This leaves a very neat little profit of $150 weekly on the investment.

KEEPING THE CAR SOLD

The Owner's Diagnosis of the Trouble Should Be Verified by an Experienced Mechanic Before the Car Is Sent to the Shop

BY A. G. PROSPERI
Service Manager, Southern Oatkland Co., Atlanta, Ga.

DEMAND and supply are the conditions which in the last two years have enabled the automobile salesman, in a good many instances, to consummate a sale in five minutes after a prospect has been approached. However, this does not mean that the sale has been completed, as the automobile so easily sold by the salesman must be kept sold by the service department. The sale is never completed as long as the car is being used.

One cause of great dissatisfaction among automobile owners is what appears to them as unsatisfactory repair work or the lack of competent mechanics.

The greatest trouble lies in the fact that most owners know very little about the car which they are driving and no one has taken the trouble to assist or instruct them, consequently, when something goes wrong or gets out of order the owner takes his car to the dealer's shop and requests certain work to be done, in nine cases out of ten, on the wrong instructions; the car is sent to the shop, the repairs which he ordered are made and the car is delivered.

Trouble Still Exists

After driving a short distance, the owner finds his trouble is still present. He returns to the shop or service station and complains. The service superintendent or shop foreman inspects the car and probably drives it several blocks with the owner, and it is found the trouble is something altogether different from what the owner had thought and ordered remedied. His car is then returned to the shop with proper instructions and, of course, the cause for complaint is remedied. After this happens several times, the owner becomes dissatisfied, as he is delayed owing to the fact that his car is sent to the shop the second time for the proper repairs and adjustments.

This condition very readily can be remedied by educating the owners. Each service station always should have a courteous superintendent, or service salesman to meet all owners immediately upon their arrival. In a good many cases the car does not need any repairs, and the owner has driven in for some information. If the service man shows an inclination to explain he will listen intently and in a very short time be able to make little adjustments himself, which, if done by all owners, would lift a heavy burden off the service station.

The time has come when the owners must be educated so as to make their own minor adjustments and this can be accomplished by a competent, courteous foreman or superintendent, who, by chatting a few minutes with each owner will give him valuable instructions and information.

Second, no car should be sent to the shop for repairs without first being driven by an inspector. If an owner request certain work to be done, the inspector should ride a sufficient distance with him to make certain the owner has made correct diagnosis, thereby making certain the car is sent to the shop with the proper instructions.

If an owner takes his car to a service station and has given instructions for the connecting rod bearings to be taken up and there remains a knock in the engine when his car is delivered, he naturally thinks the work was not properly done. The knock was not in the rod bearings in the first place, and the owner could have been so advised if the car had been inspected by a competent mechanic before it was sent to the shop. This brings on a discussion and the owner naturally asks, "Why was I not told what the trouble was before I was put to this unnecessary expense and deday?"

It is a difficult matter to keep the automobile sold under such conditions, as the owner, after taking his car several times to the shop and obtaining no satisfactory results, becomes dissatisfied with the performance of the automobile.

I am confident that all such trouble can be remedied to a great extent by instructing the owner to shoot his own minor troubles and give him the assistance of a trained mechanic when it is necessary to put his car in the shop.

He will be highly gratified at being able to correct some of his troubles unassisted and if satisfactory results are obtained from his visits to the shop you are certainly keeping him sold. He will feel that he is getting what he paid for —normal service from his car. He will be a satisfied owner, which means a man who feels that he got value received when he purchased his car and is getting a square deal from the service department.

The consequence is when this man is ready for a new car he is already sold on both your car and the service which he received. Is there any reason to believe that he will buy a different make of car?

The Motorists' Bookman

Motor Truck Design and Construction

A new book for the truck engineer by C. T. Schaeffer, published by D. Van Nostrand Co., 25 Park Place, N. Y., is a book that fills the needs for the truck designer. All manners of trucks are taken up and the design discussed in this book. The text is admirably illustrated with sectional views and halftone illustrations.

Making and Saving Profits

"Making and Saving Profits," a booklet on simplified bookkeeping systems for automobile dealers, garages and repair shops, has recently been issued by the Comfort Printing Specialty Co., St. Louis, Mo.

In the first section of the book, the retail automobile business is treated by departments, each method having been actually tried out. How to get costs, figure selling price and safeguard profits is told in a simple, easily understood language, entirely free from technical accounting terms. The second section of the book is a catalog of Comfort standardized tags and forms, every form illustrated, described and its use explained. Each form, according to the Comfort company, offers the simplest possible way of keeping track of the particular operation for which it is intended. These tags can be ordered in any quantity desired at a moderate cost. The new Comfort simplified bookkeeping system for retail automobile dealers is also described and illustrated in this catalog. This booklet is supplied upon request only.

Ford Model T Car

One of the latest books on the Ford Model T is that by Victor W. Page, published by the Norman W. Henley Publishing Co., 2 W. 45th St., New York. It takes up the entire Ford car in detail, process of disassembly and repair methods on all parts. Wiring systems are shown and completely and possible fault and their remedy of the electrical system are also given. A special section is devoted to the Fordson farm tractor and another to the new standard lighting system on the Ford car. The pages throughout the book are copiously illustrated, showing methods of operation of all parts.

EDITORIAL

Service on a Definite Basis

WHEN you have a pair of shoes repaired, the cobbler is paid a price for his work. The cobbler has rendered you a service. The cost of the material, his time, his overhead and his legitimate profit are included in the price you pay. With many concerns, motor car service is not considered on this business-like basis. With many, service is something that has no determinable value. It is something that costs, "Oh—about four-fifty." The "about" business is the factor that the automobile service business is some day going to fall with. It is a case of the blind lead the blind. Both fall. So will the service business fall, if "about" and "free service" continue.

We must see this service business in the new light. If your perspective of the proposition leads you to believe that free service has any reason at all for staying in our service world, then change your position and get a new slant; view the proposition from a new angle. Service can be made to pay. And satisfied customers can be yours, even though they do pay.

When a man tools up a factory for production of some device, the overhead figures into the cost a good deal. The per cent profit must be added. But how many service institutions run their business in the same way?

Dovetailing Our Ideas

ONE thing that seems to be coming out of the get-togethers of dealers' service men and factory men is the closer study in our factory engineering departments of the problems encountered by the service men in their contact every day with the users of automotive apparatus.

Instead of the service men cursing the factory, as heretofore, for making certain parts inaccessible, there is a tendency for all concerned to take matters up in a decent way, which has, in a number of cases, led to an elimination of undesirable features, so far as rendering good service on cars or trucks is concerned.

The men in the engineering departments of the factories do not come in contact with the ultimate purchaser of the product to as great an extent as do the service men, and oftentimes a construction that looks good on the drawing board, is wholly inadequate when it comes to keeping vehicles running properly. And the service men are the ones looked to for keeping them running. Wherefore, we contend that our factories will do well to give an attentive ear and receptive mind to suggestions or complaints that might come from some service manager struggling with a dissatisfied customer miles away from the factory.

The parts makers, too, must be looked to for easier servicing of our automotive apparatus. Too often, accessibility has been set aside in order to get good production. When it takes a mechanic several hours to replace a defective part with a new one costing about fifty cents, somebody has bungled. Much explaining to the customers, by the dealer's service man can be avoided if manufacturers will watch their designs to make sure that the labor charge of the service station for repairs is commensurate with the price of the part replaced.

Gasoline Shortage Rumors

THE fuel of the automotive industry is gasoline and kerosene and these two lighter hydrocarbons are the limiting factors which control our industry. Without fuel we cannot operate. Nine million vehicles are dependent upon this fuel for operation. Nothing else will do. Benzole will not do as yet, because it is not available in large enough quantities. Alcohol will not do, because our engines are not built to run on alcohol. Gas will not do, because we would need something different in the line of carbureters, and something different in engine construction. In fact, to-day, there is no substitute for gasoline that is universal in its adaptation. Should every drop of gasoline and kerosene in the country be lost overnight, nine million vehicles would be standing still the next day. The point is that only one factor controls the whole industry. And there are some people that appreciate the significance of this.

Occasionally, we are beset with rumors that the next generation, or perhaps the next ten years, will see the last of our fuel. And in some cases we have heard that cars sold today will not outlive their period of useful life, because the fuel will not be available to run them. This talk is propaganda, pure and simple. It is true, that as we draw on our resources, we deplete the supply. But depletion has not as yet been carried on to the point of exhaustion.

Our present cars will have ample opportunity to live their natural lives and when they are finally silent, it will not be caused by the lack of fuel. Rather, the junk pile will have claimed the car. Then it will be silent.

So don't let the sales department feel it has been stumped when the dubious prospect springs the fuel wheeze.

Manning Protests Against Alcohol as Gas Substitute

Former Bureau of Mines Director Declares Appropriation for Investigation Is Waste of Money

WASHINGTON, July 3.—It developed here today that one of the last official acts of Van H. Manning prior to his retirement as director of the Bureau of Mines was to protest against the use of a proposed appropriation of $500,000 for research into straw, hay and corn stalks as gasoline substitutes. Mr. Manning resigned his post June 1 to become director of research for the American Petroleum Institute. In his letter to Congressman Harold Knutson, author of the proposed joint resolution providing for governmental research for gasoline substitutes, the former director discouraged the idea of devoting much time to this field of inquiry.

Mr. Manning is strongly of the opinion that the problem of obtaining greater supplies of gasoline will be solved primarily by obtaining supplies from mineral matter, and that alcohols and other substitutes derived from vegetable matter can be but a minor factor in the situation for an indeterminate period of time.

"It is going to be practically necessary," he writes, "that any substitute for gasoline as an engine fuel must be practically interchangeable with gasoline. To accomplish this purpose it is necessary to blend alcohol with gasoline. But alcohol will not blend with gasoline unless there is a considerable quantity of benzole or a similar product in the mixture. Therefore, unless some other solution of this problem is found it will be necessary to produce large quantities of benzole from coal in order to blend the alcohol with gasoline and make it an interchangeable fuel."

Mr. Manning asserts that an automobile or tractor would be even more helpless without lubricants obtained from petroleum than without the gasoline. He anticipates a production of 95,000,000 gallons of benzole this year. This amount represents about two per cent of the total gasoline supply for the year. The supply of motor fuels would be greatly increased, he says, if the available oils could be extracted from every ton of coal and lignite before consumption. He illustrates his view of the hopelessness of finding substitutes in straw, hay and other vegetative matter with the declaration that the production of benzole from coals is likely to be inseparable from the utilization of alcohols from vegetable matter which you hope will be the solution of the motor fuel problem.

A program prepared by Manning for the encouragement of scientific research for motor fuels contains the following suggestions:

(1) by increasing the recovery of oil from our oil fields,

(2) by developing processes for making synthetic gasoline out of heavy oils,

(3) by encouraging the development of processes for making gasoline and gasoline substitutes out of oil shales, coals, lignites, peats, and

(4) by developing processes for making alcohols, ethers, etc., from waste vegetable matter.

The petroleum expert calls attention to the fact that it is the function of the Bureau of Mines to undertake these experiments. He intimated that the work should be confined to the bureau and not let out to the Bureau of Chemistry and other Federal agencies.

STRIKES HALT ROAD WORK

Detroit, July 6—The road building program in Wayne County, which got away to a record start at the beginning of the year has been halted by the switchmen's strike and transportation congestion. From the present outlook it is doubtful if more than 15 miles of paving will be laid during the year. More than $1,500,000 must be spent for new bridges in the plan outlined for road construction.

ST. LOUIS ESCAPES CREDIT CRISIS

St. Louis, June 27 — Officials of the Eighth Federal Reserve district say Ojote Motor Car dealers in this district have been less effected by the tight credit situation than elsewhere. St. Louis is not typically a manufacturing center and dealers and jobbers are apparently potentially well fixed financially and are able to handle their business to a large extent with their own means. The main disability is the transportation situation, it being virtually impossible to obtain cars for shipping in or out St. Louis. A representative of a leading northern manufacturer said that he was driving between 70 and 80 per cent of all the cars he sells. Manufacturing and assembling plants report no marked evidences of unemployment, but labor is more plentiful and easier to get, and there has been a number of voluntary applications for work, a thing unique during the past many months. There has been no reduction in the price of labor, the trend of wages continuing upward. Reports indicate that the demand for expensive cars is being well supplied, but moderate price vehicles are as urgently wanted as ever with orders well in excess of production and quota.

MEMPHIS TOUR STARTS

Memphis, Tenn., July 1—The "motorize-the-farm" tour, sponsored by the Memphis Automobile Dealers association, left Memphis June 28. The tour is educational and advertising or other business is dispensed with.

At night band concerts and moving pictures will be a feature. Millington, the noted aviation camp in Shelby, will be the first stop, then Covington, Ripley, Duersburg, Trenton, Humboldt, Jackson, Brownsville and other important West Tennessee points. Dyersburg night of 29th. Jackson night of July 1. Brownsville morning July 2.

Individual Banks Care for Kansas City Dealers

Federal Reserve Banks Limitations Disregarded by Many Smaller Local Institutions

KANSAS CITY, July 6—Southwestern automobile dealers are pleased by the favorable attitude taken by Kansas City banks toward financing automotive dealers and automobile financing corporations in this territory. While the Kansas City Federal Reserve Bank has issued a statement to the banks of the Tenth Federal Reserve District that it will under no consideration accept automobile paper for rediscount, the Kansas City bankers are caring for their customers in a majority of cases. Though loans on automobiles are closely limited, dealers of good credit standing are allowed small capital. Bankers are invariably urging dealers to hold their borrowings to the lowest possible level. Automobile financing companies are extended credit at 7 and 8 per cent.

The volume of individual purchases handled by the banks is very small. The majority of individuals purchasing passenger cars handle their financing through the automobile financing corporations who demand a first payment of 33 to 50 per cent, and a complete payment in ten to twelve months. The strain on these companies has been very great the last month, in which time, three of the local companies have been forced to liquidate. Only automobile financing companies in good financial standing or those whose banking connections are the strongest are showing profitable returns.

USED CAR PRICES IN DROP

Bloomington, Ill., July 3—Central Illinois motor car dealers are now able to supply their patrons with cars, deliveries catching up with orders for the first time in several years. With abundance of new cars, the used car market has weakened and it is no longer possible to obtain the fancy prices for second hand cars which prevailed during the past two years. As a result, dealers here are becoming more conservative in their bids for used cars in applying upon the purchase of new. Country roads are now in good condition in Illinois and driveaways are moving from the factories in fast time and the cars are arriving in better condition.

ASK FOR DRIVERS LICENSES

Cleveland, July 3—The Board of Trustees of the Automotive association at their regular meeting Wednesday, June 23rd, endorsed the general principles of a law requiring all motor vehicle operators in Ohio to be licensed by the state and forwarded a letter of endorsement to the Cleveland Safety Council of the Cleveland Chamber of Commerce who are acting as sponsors for the contemplated legislation.

Milwaukee Farm Truck Tour Proves Highly Successful

MILWAUKEE, Wis., July 3—The first annual Wisconsin motor truck demonstration tour, conducted June 28 to July 3 by Milwaukee distributors of motor trucks under auspices of The Milwaukee Sentinel, brought home to hundreds of farmers in eastern and central Wisconsin some brand new thought and suggestions relative to the efficiency and economy of the commercial vehicle. Twenty distributors, representing as many different makes of trucks, participated. They were:

L. D. Frint Motor Co., Olds; Downer Garage & Sales Co., Winther; Nash Motors Co., Nash Quad; Pauly Motor Truck Co., Federal; Stoughton Wagon Co., Stoughton; E. M. Sullivan Motor Co., Diamond T.; J. E. Derse Co., Commerce; Motor Products, Inc., Republic; Badger State Sales Co., International; Curtis Auto Co., Reo; Sterling Motor Truck Co., Sterling; Alfred Reeke Co., Nash; M. D. Newald Co., Stewart; Schmidt Motor Car Co., Clydesdale; West Side Buick Co., G. M. C.; Herford-White Co., Graham; KisselKar Co., Kissel; E. W. Clark Motor Co., Maxwell; Osmond Motor Car Co., Paige; Upham-Schacht, Inc., Service.

The expedition started from Milwaukee Monday morning, June 28, and returned Saturday afternoon, July 3, having covered 350 miles. It was limited to 2-ton trucks with pneumatic tire equipment. The main idea was to educate the farmer to the utility of the motor vehicle in agricultural haulage, as well as to demonstrate the only feasible means of efficient and economical transportation. Free demonstrations were given at every stop and at times the line was halted while a truck or two went out into a farmer's field at a psychological moment to do a piece of hauling.

Frank A. Meyer of the Sterling Motor Truck Co. acted as tourmaster, and the tour committee consisted of members of the motor truck division of the Milwaukee Automotive Dealers' association, which cordially supported the enterprise. The committee consisted of Alfred Reeke, chairman; Bart J. Ruddle, executive secretary; W. P. Upham, H. P. Robinson, M. D. Newald, C. W. Beckler, James T. Drought and Manning Vaughan, of The Sentinel.

BUSSES FIGHT CAR STRIKE

Dayton, Ohio, June 25.—Municipal bus service has been started here to take the place of the street cars tied up by strike, and 300 small automobiles are being operated in conjunction with the busses. Regular schedules are being maintained and a straight fare of five cents with free transfers is the rule. Some little confusion has resulted, but as an emergency service the bus and automobile system is proving satisfactory.

INCREASE TRUCK TRANSPORTATION

Atlanta, Ga., July 6—Recognizing the fact that the motor truck as an intercity carrier has assumed a permanent and important place in the general scheme of transportation, the Farm Bureau of the Atlanta Chamber of Commerce, of which M. C. Gay is the secretary, and the Georgia State College of Agriculture, working in co-operation with county agents, extension specialists and other agencies, is planning the organization of motor truck lines to transport farm products from nearby points to Atlanta, and to carry freight and express to the rural districts and the smaller towns and communities of this section. Under the plan proposed and that will probably be carried out in the near future, a series of inter-city truck lines will be established out of Atlanta, connecting all of the smaller towns and nearby cities with the larger center, which will furnish means of quick and cheap transportation.

ELECT EQUIPMENT OFFICERS

Atlanta Ga., July 6—Following the recent temporary formation of the Atlanta Automotive Equipment Association, the membership of which includes virtually all of the accessory, tire and equipment dealers in the city, the permanent organization has now been formed and the following officers elected to serve for the ensuing year: Ed F. Yancey, president; C. E. Speer, vice-president; Rufus Barnett, secretary; Stewart Brown, treasurer; George White, John K. Gewinner and Lon Credelle, with the above officers, comprise the board of directors. Fred Alexander, Jack Knowlton, Fred N. Dorn, D. B. Donaldson and Lon Credelle were appointed as a membership committee. Eighteen charter members joined the association.

RAINS HURT OHIO TRUCK TOUR

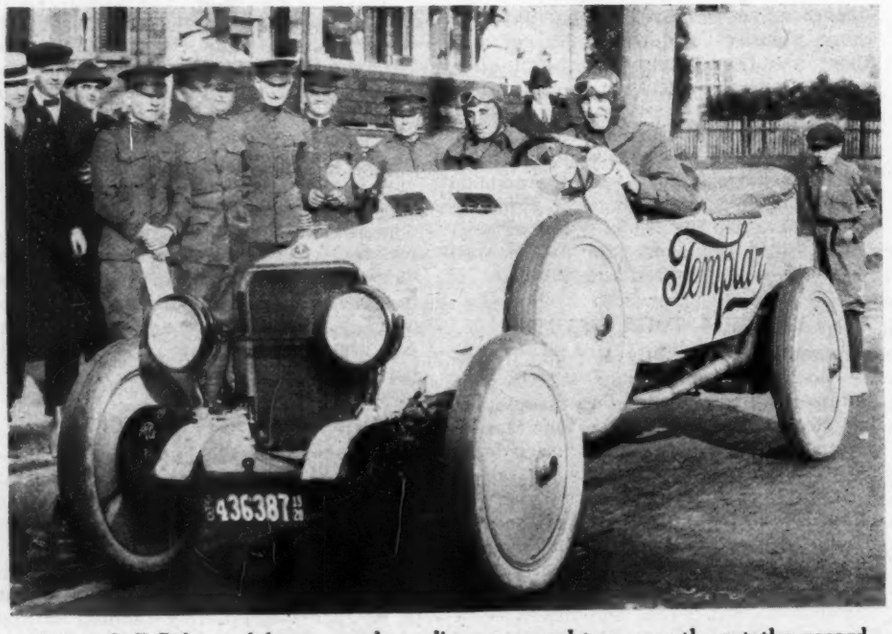
Cincinnati, July 5.—One of the most successful tours ever attempted by a local organization was Truck and Farm Demonstration tour, held during the past week by the Cincinnati Truck Dealers' Association. More than 300 miles in Ohio, Indiana and Kentucky were covered in the tour and more than twenty-one towns visited.

Truck demonstrations were curtailed during the trip due somewhat to overnight rains that preceded the tour, but a number of opportunities were afforded to demonstrate the efficiency of motor trucks on the farm. The various committees in charge of the tour under Harry Kelly and Harry Shockley made every effort to make the tour a success, which was accomplished without a doubt.

FIREBUG GETS FIVE YEARS

Janesville, Wis., June 26.—J. S. Williams, a member of the firm of Bellman & Williams, conducting a garage business at Evansville, Wis., was sentenced to five years at hard labor in state's prison by Judge Maxfield in Municipal court here. Williams confessed to having set fire to the garage of the firm on May 27. Although at first implicating his partner, Edward Bellman, a later confession absolved Bellman of blame

Cannonball Baker Sets a New Record



Cannonball Baker, of fame as a long distance speedster, recently cut the record from New York to Chicago in a Templar car. Baker left New York 5:43 one evening and arrived in Chicago at 8:33 the next, a total elapsed time of 25 hours 50 minutes

for the fire. The case against Bellman was dismissed for lack of evidence. Williams laid claim that the fire was accidental due to an explosion, but admitted going home without sounding an alarm. That it would make a fine place for a new garage was the only reason he advanced for the action.

ANDY GUMP HAS TENT SALESROOM

Danville, July 3—Because he could not rent a building which would answer as a salesroom, and because materials could not be furnished to erect a new plant, Andrew Gump, Danville, Ill., purchased a tent 30 by 50 ft. and set it up on a vacant lot. He will use this tent as a sales headquarters until a building can be secured. Mr. Gump will handle new and old motor cars.

ESSEX IN NEW RECORD

Chicago, July 2—Arthur Lee, associated with the Hudson Motor Co. of Illinois, Chicago distributors for Hudson and Essex cars, established a new road record between Detroit and Chicago when he drove an Essex for the distance in 8 hours and 18 minutes. The former record was held by Ralph De Palma in a Packard in 8 hours 40 minutes. The run was made via Jackson, Battle Creek, Kalamazoo and Michigan City.

Mr. Lee, who is in charge of driveaways for the Chicago Hudson branch, declares he went to Detroit Wednesday evening and Thursday morning went to the Hudson factory where he took a brand new car from the testing floor. The speedometer registered less than 20 miles when he left Detroit, so the run was accomplished with what was, for all practical purposes, a brand new car which had had absolutely no running in. Five other Essex cars were in the driveaway and all came close to the record time.

Stephens Is Winner in Coast Reliability-Economy Tour

SACRAMENTO, CALIF., July 3—Winning in a field of twenty-four entries, the Stephens Salient nosed out a victory over the National in the First Annual Sacramento-Tallac Reliability and Economy Run, June 21 and 22. The event was given by the Sacramento Motor Car Dealers' association, and was the biggest staged on the Pacific Coast in years, and the most representative from the point of the range of prices in cars entered.

The distance was 261 miles, to Lake Tahoe over the American River route, around the west side of the lake to Tahoe City, thence to Truckee and over the Sierra summit to Auburn and thence to Sacramento. Two days were given the event, the first day's mileage being 109 miles to Tallac; and the second day's 152. Five and a half hours were allowed for the trip up, which went from almost sea level at Sacramento to an elevation of 7,600 at the summit of the Sierra Nevada mountains. The return was a harder pull, although the elevation at the summit of the Lake Donner grade is 500 feet less than the other pass. Six hours and a half were allowed for the return.

It was a gruelling test all around. The cars were required to be strictly stock cars, owned by the dealers. The clutch and gears were engaged at all times, and no engine stops on the road were permitted without penalty. The hills are much harder to negotiate even than those on the road to the Yosemite National Park, and there was no car which was not forced into low gear at times.

Only three of the twenty-four cars failed to finish. The Stearns could not start at Tallac and was towed for its start and disqualified. The R & V Knight developed engine trouble and withdrew, as did the Cleveland with a broken carbureter adjustment when the car hit a rock in passing a tourist machine. All the other cars came through in good shape, and finished on time, a rather remarkable performance when it is considered they were allowed a leeway of but two minutes ahead or behind time to check in.

Only two minor accidents marred the race. The Cole was sideswiped by a tourist and the Studebaker suffered a similar accident at the hands of a woman driver.

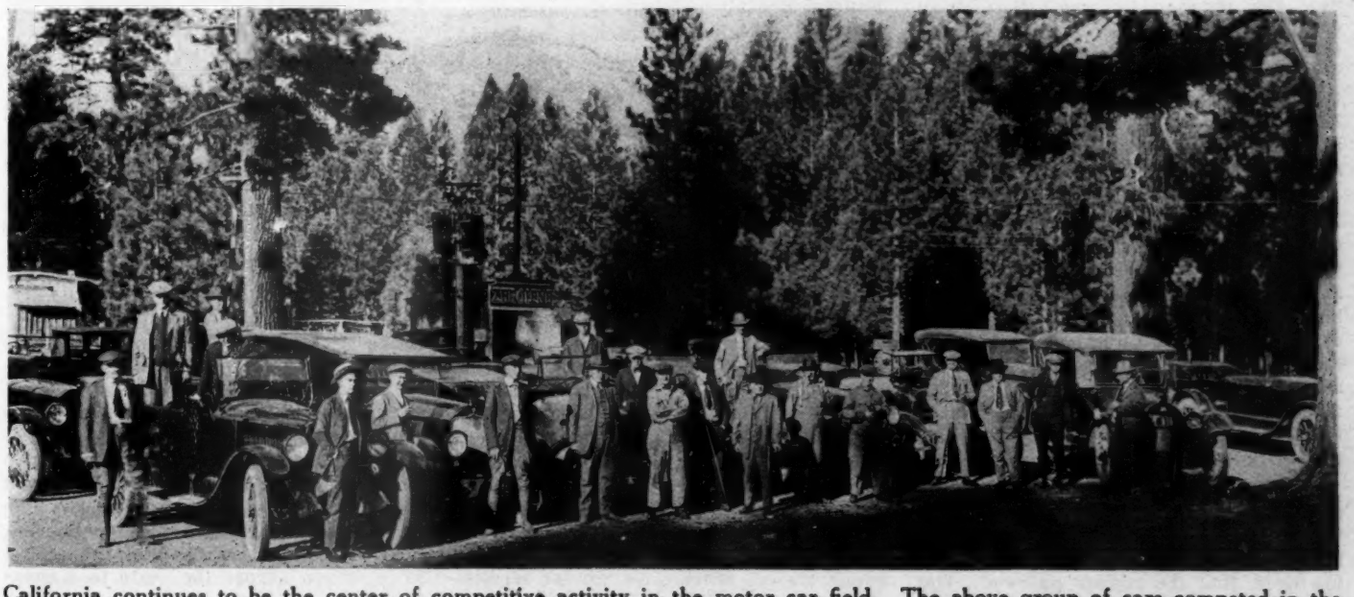
The sweepstakes honors were decided by dividing the weight of the car and its passengers and equipment, by the number of gallons of gasoline used. From the percentage thus gained, one point was deducted for each pint of oil and each quart of water used, and for each bit of engine trouble, two points when the engine trouble required more than a minute to remedy.

The class honors were on economy alone, weight and reliability not figuring. The Essex outstripped all cars entered in gasoline consumption, requiring but 10¾ gallons for the 261 miles. The oil and water economy was reckoned in the class results by adding a mile for each quart of water and each pint of oil used.

100 CARS IN RELIABILITY RUN

Chico, Calif., July 6—One hundred cars have been entered for the reliability run of the Butte County Automobile Trades association, to be run to Westwood over the Lake Almanor highway.

Cars in Pacific Coast Reliability Run



California continues to be the center of competitive activity in the motor car field. The above group of cars competed in the Sacramento-Tallac Reliability and Economy Run which was held June 21 and 22

Chapin Talks of Need For Educational Co-operation

Graduate With Practical Knowledge Far More Valuable Than One Not so Equipped

ANN ARBOR, Mich., July 6—Emphasizing the need for co-operation between the educational institutions and the industries of the country in the training of engineers and the necessity for practical effort along with the theoretical education, Roy D. Chapin, president of Hudson Motor Car Co., read an interesting paper before the National Society for the Promotion of Engineering Education in session here. Lengthy discussion followed the paper, all of the educators present indorsing the plan for factory work by students during the vacation season in gaining a practical knowledge of the profession.

Mr. Chapin told the convention the man who emerged from the university with a practical knowledge of engineering to add to his scholastic preparation would be in position to secure compensation from 20 to 50 per cent greater at the start than the man who entered industry with nothing save his university diploma. He urged also that the remuneration for services during the vacation period would be a big factor and declared in no other way could a student secure knowledge of the various departments in an industrial institution, with which he would have to co-operate and harmonize upon entering the service after his graduation.

Regret Lack of Business Knowledge

Several instances had come to his attention, Mr. Chapin said, where engineers had expressed regret that they had not taken advantage of opportunities to get a practical knowledge while completing their university course. He said they felt themselves lacking in self-confidence as a result of their lack of business training and he urged that every engineering student in addition to his technical training should take a certain number of courses in business administration to furnish the groundwork for later executive opportunities and a truer aspect as to what is commercial engineering.

Practical education during the vacation periods, Mr. Chapin said, would enable students to find out before graduation if they were for any reason unfitted for the line of engineering they had chosen for a profession and permit of their diversion to other lines. The lack of practical training in the university, he said, necessitates such training after graduation, holding the graduate back until he has secured the combination of both theory and practice.

"In general," said Mr. Chapin, "the most successful engineers are those in whom you have developed a commercial instinct which so guides their engineering work that the results pay out. The engineer should think outside his job. He should have the courage to take responsibility and go ahead. To do this he must have a solid foundation of well rounded training and it is the concensus that as yet you are not furnishing that solid foundation for the average graduate.

"The majority of the engineering graduates appear to have acquired the information imparted to them in college, but few of them have learned to apply that information in practice. The engineer should have a sufficiently broad conception of the functions of the various executive departments and the relationships between them and his own to endow him with a sympathetic understanding of their difficulties and problems. As a matter of fact, an engineering graduate in the factory is a liability for some time.

"America is entering a period of enormous industrial expansion and with her rapidly growing export trade our engineering methods rapidly are coming into competition with those of the European engineers. It is your desire naturally to lead the world and this is expressed best in the utility of work turned out by the graduates of your institutions.

"Give these men during their college course a more thorough practical insight into the everyday problems they will encounter after graduation, even though it takes years to build up the practical contacts necessary."

TO HOLD CLOSED CAR SHOW

Buffalo, July 6—Buffalo is to have its first closed car show this fall. At a meeting of the Buffalo Automobile Dealers association it was decided to have a separate closed car show with sedans, coupes and other enclosed body types on display. Arrangements for the show are now being made.

The association opened its membership to various department heads of motor companies and those in allied industries and trades. This is done in an effort to centralize the entire motor industry in one association. The association will issue a monthly publication, Automotive Progress, showing activities of the motor industry in and near Buffalo.

MINNESOTA HAS AIR MILITIA

Minneapolis, July 6—Authorization for the organization of an areo squadron by the Minnesota National Guard, the first authorization of this kind, has been received from the War Department by Adjutant General W. H. Rhinow. The twenty-two officers and eighty-one men are being recruited in the Twin Cities, the need being for skilled pilots, observers, mechanics, truck and automobile drivers and sail makers. As soon as the personnel of the new unit is completed and inspected by army officers, the equipment consisting of eight planes, trucks, motor cars, motorcycles and other paraphernalia will be issued by the War Department. Headquarters and hangars will be provided at the old Speedway. It is expected that the air squadron will prove of particular service in case of forest fires.

Commission on Car Service Helps Automotive Industry

New York Central Orders 2500 Automobile Cars and Southern Pacific 500

NEW YORK, July 6.—Some slight recognition of the shipping needs of the automotive industry has been granted by the Commission on Car Service of the railroads which has directed that survey of the automobile car situation be made at intervals by taking the location statements of roads owning such cars and from that determining the total of all owned on each principal road. The traffic committee of the National Automobile Chamber of Commerce believes this will develop facts which may lead to helpful action. In this connection it is stated that the New York Central has ordered 2500 automobile cars and the Southern Pacific 500.

The accumulation above normal of loaded and empty cars awaiting movement has been reduced from 288,000 early in April to 116,000 on June 11. While this reduction is encouraging it should not lead to undue optimism. There can be no marked or permanent improvement for months to come and the transportation situation is likely to be worse before it is better.

Conditions now, in early summer when there should be a large surplus of cars, are what might normally be expected in the middle of a hard winter. Industrial plants in many parts of the country are on the verge of closing because of a shortage of fuel and the same is true of public utilities. Those in New York are going on a hand to mouth basis and traction lines have been able to keep in operation only by pooling their fuel resources.

Up to June 15 only 2,564,983 tons of coal had been dumped at Lake Erie ports of the 29,000,000 tons required during this season. This compares with 7,076,000 tons dumped on the same date in 1919 and 5,879,000 even in the war days of 1918. Authorities estimate that the tonnage dumped on this date should have been not less than 6,500,000 tons. The Interstate Commerce Commission is using all its energies to facilitate the movement of fuel in an effort to store up a surplus for winter but present needs scarcely are being met in many parts of the country.

GET TRUCKS BY WATER

St. Louis, July 6.—The White Co. branch here received a consignment of sixty-nine White trucks via the barge Mariner and the steel tug John L. Lowery. The trucks moved under their own power from Cleveland to Pittsburg, and thence to St. Louis by water. The trip from Pittsburgh began on June 14, ending here July 1. Fifteen of the trucks were driven across the state to Kansas City.

Makers Include Dealers Problems with Their Own

N. A. C. C. Executive Says Manufacturers Are Helping Retailers in Ever Increasing Measure

NEW YORK, July 6—Manufacturers are concerning themselves more and more with the troubles of their dealers, according to information brought back by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, after a trip through the central west. The dark clouds on the dealers' credit horizon, which have inclined some of the more timid to seek their storm cellars, show signs of lifting a bit, although there is no reason to expect they will vanish in the immediate future.

Education is the main factor in bringing about a change in the attitude of bankers. They are being sold on the fact that automobiles are transportation. They are learning that until there is more transportation there can be no easing of railroad congestion and the consequent danger of industrial paralysis.

Bankers More Liberal With Credit

At least one passenger car company reports that its representatives have talked with the bankers in many of the smaller towns where they have dealers and the banks have agreed to a loosening up of credit. There is a steadily expanding disposition to regard the reputable dealer, who is on a sound business basis, as a merchant rather than a parasite. To these men most banks will extend enough credit to carry them on a living basis.

Dealers will not be able to continue on the scale to which they have become accustomed and they will be able to do very little business on a credit basis, but they will be loaned enough money to enable them to make a living. Those who have been stocking 25 cars may not be able to stock more than 5 or 10, but they will be permitted to handle that many.

One of the faults manufacturers find with their dealers is that they have gotten out of touch with their banks and they are urged to see their banker at every opportunity, losing no chance to sell him on the importance of motor transportation.

It is believed the worst is over for the truck dealers who have been having credit troubles. Bankers in the smaller places are becoming more familiar with the underlying economics of the present situation. They are realizing that everything must be done to expand transportation and that the motor truck is the best means available. It is possible that time sales of trucks may be allowed to a greater extent where the purchasers actually need them. One middle western company reports that it has arranged to finance its dealers.

Up to the present time the dealer seems to have been the chief sufferer. The manufacturers do not view the conditions which now prevail as an unmitigated evil. They feel that perhaps the industry was expanding a bit too fast and that it may be well to get it back on a more normal basis. If it does nothing else it will give them an opportunity to solve some of their labor troubles and balance their inventories.

On this trip Reeves visited Detroit, Chicago, Cleveland, Indianapolis and smaller towns in Indiana. In Indiana he visited many dealers and bankers to discuss conditions with them. He also attended the S. A. E. meeting at Ottawa Beach.

UNION TRUCKS HURT STREETS

Wheeling, W. Va., July 6—What to do about the heavy coal trucks, which are wrecking the streets of this city and vicinity is a problem confronting officials here. Loads carried are too heavy for the streets, which are torn up as rapidly as they can be repaired.

Following the public clamor, especially on the part of motorists, sixty-eight owners of trucks, mainly coal companies were arrested, charged with violating the city's trucking ordinances in overloading the trucks. Officials picked out seventy-four trucks at random in one day and their loads weighed. It is charged seventy-eight of them were found to be violating the city ordinance.

The city ordinance restricts these heavy trucks to eight miles per hour and 600 pounds per inch of total tire width.

STOUT TO BUILD METAL PLANES

Detroit, July 6.—William B. Stout, technical adviser to the aircraft board during the war and former chief engineer of the aircraft division of the Packard Motor Car Co., has been awarded a contract by the United States navy department for six all-metal airplanes of a type never before attempted in this country. The action of the government is said to have been hastened by the successful performances in America of the German junior model, similar to the one designed by Mr. Stout which made a non-stop flight from Omaha to Philadelphia recently.

The capacity of the planes ordered from the Stout Engineering Laboratories has not been announced. The German airplane carries six passengers. Like the German plane, the Stout type will dispense with the external bracing of struts and wires and inflammable woods, taking their strength solely from internal braces.

GETS BIG BARGE SHIPMENT

New Orleans, La., July 6—The Automotive Sales Company has just received the largest shipment of automobiles ever brought into New Orleans by water. It consists of 290 Chalmers and Maxwell passenger cars and Maxwell trucks, brought from Cincinnati on six barges of the federal waterways Mississippi River Service. This shipment is valued at $468,370, and is one of the most valuable cargoes ever handled by the government barge service on the river.

Chicago Federal Reserve Favors Automotive Industry

Sectional Bank Officials Disclaim Any Intent to Single Out Business as Non-essential

CHICAGO, July 2—There is no disposition on the part of the Federal Reserve Bank of Chicago to place any restriction upon automotive credits of any sort. The Federal Reserve Bank here has never refused to rediscount automobile paper of any kind and is continuing to handle paper of this kind regardless of any action which may have been taken in other districts.

Officials of the Chicago bank disclaim any official knowledge of the action of the Kansas City and Atlanta banks in refusing to rediscount automobile paper. Their only knowledge of such action by these banks, is based upon what they have read in various newspaper and business paper reports.

Judged Upon Own Merits

Truck and tractor paper is judged purely upon its merits, just as commercial paper of any other sort. Issuance of credits on such paper is a matter solely for local banks to decide and the Federal Reserve Bank will rediscount such paper when it carries the endorsement of responsible dealers or firms. In this respect, automotive paper is handled just as commercial paper of any other sort.

Chicago Reserve Bank officials lay stress upon the assertion that they have never attempted to class any industry either as essential or non-essential and declare they will not do so except on direct orders from the governors of the Federal Reserve Bank, regardless of action which may have been taken or may be taken elsewhere in the United States.

GAS SHORTAGE HITS FARMERS

Seattle, Wash., July 6—With the gasoline situation still acute in the state of Washington, all available horses in the farming sections are being brought into service once more in hauling products from the farm to the markets. Old buggies that have long since given way before the motor vehicle are also being invoked for pleasure purposes. The farmers are conserving what fuel they can obtain to operate their tractors and other farm machinery requiring gasoline and are making the horse do all the work it can.

The gasoline shortage is beginning to have a noticeably adverse effect on the automobile business generally. With "motorizing weather," late in arriving in this section, at last at hand, the public has been put on a rigid rationing basis, which has forced hundreds of motorists to forsake all motoring. The shortage is also reported to have contributed to the unusual number of cars being placed on the second hand market in Seattle and other Northwest cities.

Cleveland Truck Men Protest Against Undue Discrimination

Issue Bulletin Against Propaganda That Commercial Vehicles Are Damaging Roads

CLEVELAND, July 3—The recently formed Truck Division of the Automotive association, whose chairman is Irving C. Moller of the Mack-International Truck Co., and whose vice-chairman is A. O. Wood of the A. O. Wood Truck Sales Co., requested the Automotive association to write the following letter to the traffic commissioner of The Cleveland Chamber of Commerce and asked that the same be printed in the bulletin of the committee which is forwarded to about fifteen hundred shippers in Cleveland:

"F. H. Baer, Traffic Commissioner, The Cleveland Chamber of Commerce. Dear Sir: There has recently been considerable newspaper publicity given to the fact that motor trucks are contributing to the disintegration of our city streets and paved inter-city roads. This publicity has probably resulted in the stricter enforcement of the city ordinance prohibiting loading of trucks over a gross weight of ten tons.

"Investigation shows that in many cases the independent truck owner who works on contract is only partially responsible for this overloading. Part of the responsibility rests with the Shipping Department of the corporations who are having their goods hauled by these independent truck owners. Heads of shipping departments should be instructed to see to it that contract trucks do not load over the ten-ton limit (gross weight of truck and load). They should also be prohibited from insisting upon independent truck owners carrying an overload. Your co-operation in this matter will have two beneficial results: It will aid in preserving the city streets; it will keep the truck industry which has become a vital factor in city and short-haul transportation from falling into disrepute.

"Very truly yours,
"THE AUTOMOTIVE ASSOCIATION."

DISCUSS TRUCK CREDITS

New York, July 6—Credit was the most important subject discussed at the conference of truck sales managers at Lake Geneva, Wis., last Friday and Saturday. Practical plans were worked out to overcome the attitude of bankers which is retarding sales in some sections of the country.

A committee of three was appointed which will delegate two strong representatives of the truck industry to go into each of the districts where credit has been refused on truck paper and sell the bankers on the importance of fostering trucks at a time when the railroads have broken down and transportation is absolutely essential if business is to continue.

Efforts will be centered on bankers in smaller cities and in country towns. It is believed that they are laboring under a misapprehension as to the attitude of the Federal Reserve board on truck paper. So far as any one in the industry knows, the board has shown no disposition whatever to curb truck business where it is legitimate, not even when sales are made on a liberal time allowance.

It was reported that there is no trouble whatever in the east in regard to truck credits, but that the main difficulties is on the Pacific coast, especially around Seattle and to a lesser extent in Oregon and California. Other trouble spots are the Minneapolis, Denver and Kansas City districts. There are also some places in the south where banks have refused to discount truck paper.

CROPS TIE UP TRANSPORTATION

Kansas City, July 3—The transportation situation in the southwest is closely demanding the attention of the dealers in this territory. The wheat crop of 1919 is still in a great measure unmoved and the present crop which is now being harvested will probably follow last year's crop to the East. Bankers are advising their customers to store the present crop in the belief that transportation conditions will clear following the moving of the old crop. Flat cars for automobiles are at a premium. One Kansas City dealer is sending his salesmen to the eastern production points to drive his orders to points where transportation may be secured.

INCREASE REPUBLIC PRODUCTION

New York, July 3.—Production to full capacity at the plant of the Republic Motor Truck Co., Alma, Mich., is proposed by John F. Willys, now in full control of the corporation, it was learned at his offices here to-day. No formal announcement of plans has been made and it is intimated none is needed. Nor has any explanation been offered of how Mr. Willys came to buy the stock holdings of F. W. Ruggles. It is denied, however, that there was any disagreement between the two men.

STEADY DEMAND IN MILWAUKEE

Milwaukee, July 5—While prospects are not so much inclined to fall all over themselves to get cars as they were four to six months ago, local dealers report that the demand remains healthy and is of such proportions that display floors continued to be depleted, as incoming cars are required to fill old orders. The insistence of dealers upon greater cash payments and shorter terms has had some effect upon discouraging buyers, but as a rule this is regarded with more or less satisfaction, for a better class of business is resulting. This city occupies an especially fortunate position in relation to the source of production, it being close to factories, which makes driveaways convenient and inexpensive.

Rochester Adopts No Parking Rule for Business District

Traffic Congestion Forces Eastern City to Place Heavy Restrictions on Motor Cars

ROCHESTER, July 3—An ordinance whereby all congestion in the downtown district between the hours of 7 a. m. and 6:30 p. m. is done away with, has been passed here, and new traffic laws have been made in order to conform with the new plan. Parking in Main street, for a distance of more than a mile, is forbidden until after 6:30 o'clock at night. This is the first step taken by the city fathers to correct the faults of the traffic system, and to leave a clear way for all running automobiles during the day time.

A novel section of the new ordinance compels every machine to be equipped with a device whereby snow or rain will not bother him in driving. Unless the machine is equipped with apparatus to wipe the windshield off now and then, the glass must not extend above the line of vision. This is to prevent many automobile accidents which occur when it is snowing or raining, and the city thinks that this is the best way to eliminate such danger.

Under the new law a vehicle "must not pass a vehicle ahead, leave the line on the right, unless there is a clear way of twenty-five feet in advance on the left.

"Must not, while both are in motion, come within ten feet of a vehicle in front of it at or near a crosswalk.

"Must not be driven or conveyed through any of the streets in the limited district while being used exclusively for advertising purposes."

Farther on the ordinance states that "all vehicles must be parked parallel with the curb, or at right angles thereto or other wise, as directed by the commissioner of public safety, either through the police department or by signs placed or erected. If parked at right angles to the curb, a vehicle must be left standing so that its right hand running board is not less than one foot or more than eighteen inches from the left hand running board of the car or vehicle on the right."

ASKS FOR TRUCK LOADS

Cincinnati, July 6—Otis R. Hess, assistant manager of Division of Manufacturers of the Cincinnati Chamber of Commerce has asked local truck manufacturers to co-operate in a plan to utilize empty trucks leaving the city for neighboring sections, in an effort to relieve traffic congestion on short hauls from Cincinnati. Hess believes several hundred tons of freight may be hauled in these trucks daily. He is seeking to establish a central office where drivers of empty trucks may come in contact with shippers.

Interstate Commission in Freight Pronouncements

Limits Cars Which May Be Used for Transportation of Passenger Cars to Closed Type

WASHINGTON, July 3—Conferences with officials of the Interstate Commerce Commission and the American Railway association to-day cleared up much uncertainty as to the status of the automotive industry in the distribution of freight cars. J. S. Marvin, traffic manager, National Automobile Chamber of Commerce and C. R. Scharff of the Chevrolet Motor Company, representing the automotive industry, obtained concessions and modifications which will relieve the transportation tangle.

W. C. Kendall, chairman, Car Service Commission, notified the carriers that flat cars may be used for loading automobiles boxed for export when shipping permits are authorized. This order will greatly facilitate export business. The railroads were also advised that the Car Service Commission had consented to a modification of orders against use of low side or mill gondolas to expedite the movement of trucks, tractors and threshing machines. The Interstate Commerce Commission and the Car Service Commission refused to remove the ban against the use of flat cars for shipment of passenger automobiles. They ruled that "flat cars must not be used for the handling of passenger automobiles or other freight that ordinarily loads in other types of cars. Chairman Kendall explained that trucks are exempted from this provision of the order.

The representatives of the automotive industry protested against the specific reference to passenger automobiles in the order. The officials, however, insisted that this method was essential to insure an adequate distribution of trucks, tractors and farm machinery. Farmers have complained of the failure of the various manufacturers to deliver equipment. The railroads point out that special treatment must be accorded these machines particularly at this season when they are needed to move the crops.

Mr. Marvin has made it known to the various government agencies and carriers that the automotive industry intends to fight for its rights as one of the largest contributors to the railroad's revenues. He points out that factories are sorely in need of cars both for the shipment of raw materials and finished products. It is contended that all industries should share alike in distribution of cars after coal and other priorities are handled.

ENJOIN CINCINNATI STRIKERS

Cincinnati, July 5.—Temporary injunctions against interference by striking employees have been granted by Judge Smith Hicklenlooper in Superior Court to the Fox-Klein Motor Car Company and the O. Armleder Company. "Picketing factories in a threatening manner, using improper language, threatening employees and following or visiting employees without their consent" are forbidden.

DEMANDS 50 PER CENT PAYMENT

Kansas City, July 6—A prominent local financing corporation has cut its credit terms on passenger cars to a 50 per cent first payment basis with ten months allowed to complete the payment. Formerly this company allowed the purchaser to take out fire and theft insurance but it now demands fire, theft and collission insurance. Formerly passenger cars financed through this company were made on a 25 per cent first payment basis with twelve months allowed to complete the transaction. Terms for financing trucks and tractors are on a 33 1-3 per cent first payment basis with twelve months allowed to complete the deal.

Federal Reserve Bank Satisfied With Results

Limitation of Credits Has Greatly Relieved Situation Say Governors of Institutions

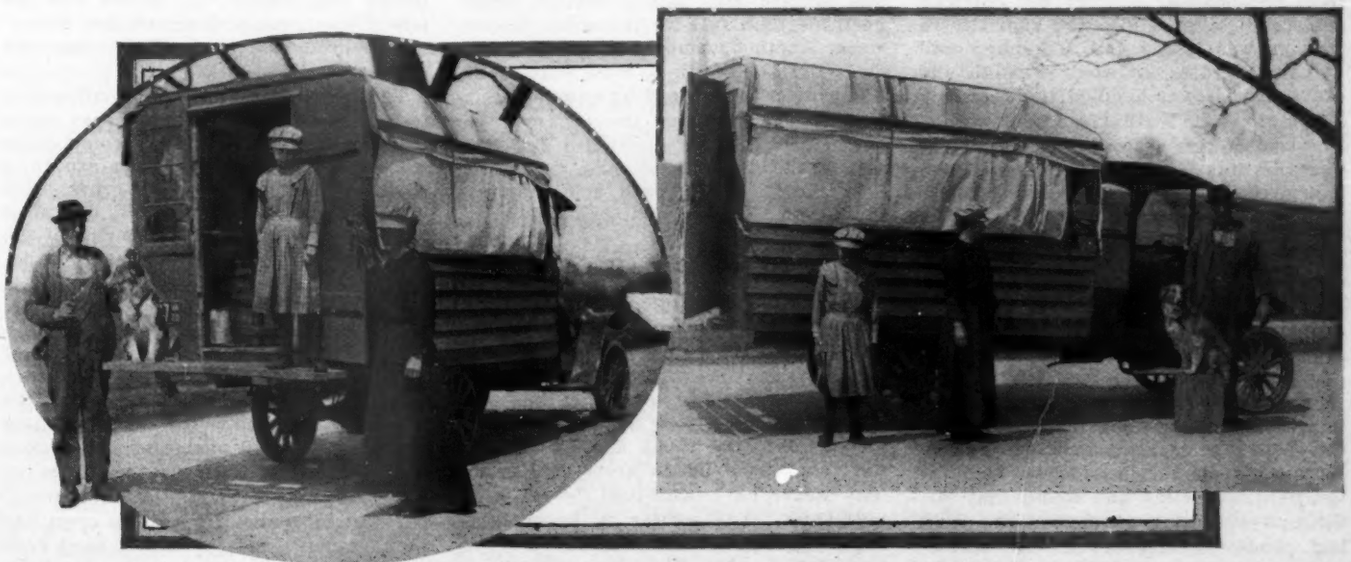
WASHINGTON, July 6—Reviewing general business and financial conditions during June, the Federal Reserve Board has found the control of credit and discrimination between non-essential and speculative borrowing has produced results. They believe the present price situation is unsettled. Chaotic conditions are reported to exist in manufacturing circles, ranging from extreme optimism to equally extreme pessimism.

With complete reports as to the country's financial condition for the month of May at hand, the Federal Reserve Board finds the reserve ratio at Federal Reserve Banks improved by about 2 per cent. They attribute this gain to the policy adopted during May for the curtailment of credit by the revision of applications for loans.

It is the opinion of the Federal agency that there is evidence of a decreased volume of demand in the retail trade. "Quite generally," the Board says, "there is a tendency to settle down to a readjustment basis and to proceed with business upon the new level of prices and demand." The railroad congestion is contributing heavily to the backward tendency in all branches of manufacture.

GOODYEAR COAST PLANT READY

Akron, Ohio, July 3—Information from the new Goodyear tire plant, at Los Angeles, is to the effect that the factory started production July 1. The company began operation with 2,000 employees and this ultimately will be increased to 9,000. A daily production of 7,500 tires to supply the territory west of Denver is planned.



J. L. French, who is an expert machinist, decided that other parts of the United States than Virginia were worthy of the once-over, and accordingly started out with his family. In order to avoid discomforts of ordinary travel, Mr. French bought a Maxwell 1-ton truck and fitted it with a special body containing three cots, an oil stove and all necessary equipment for a long trip. He averages about 30 miles a day and declares that it beats traveling by train all hollow when it comes to conveniences.

Charge Oil Firms With Responsibility for Shortage

Oregon Dealers Declare There Is No Real Shortage But Is Plan to Raise Price

PORTLAND, Ore., July 6.—Charges that the oil companies operating in this territory are responsible for the gasoline shortage of the past several weeks which has paralyzed business in many parts of Oregon, with specific instances of alleged discrimination in distribution of gasoline, are contained in a report just made to the Dealers Motor Car Association of Oregon by a special committee named by it to investigate and take steps to relieve the shortage.

The committee has through its own efforts imported to date 160,000 gallons of gasoline by rail from independent sources in Southern California to relieve the Oregon shortage. Most of this gasoline has been shipped to smaller towns throughout the state which for weeks were reduced to the scantiest rations of motor fuel.

In its report the committee says:

"Your committee's opinion is that there is no gasoline shortage. There has been no gasoline shortage. And if the public will keep in mind the statements issued by the oil companies since April 1, the committee will be able to prove that there has been no gasoline shortage in the United States.

Preparing Public for High Prices

"The committee will also hazard the opinion that the public is being prepared to pay a higher price for gasoline.

"The gasoline situation to-day is peculiar unto itself. No precedent established is likely to hold good over the following day. The committee has found conditions changed to such an extent that it prefers to state them in facts and figures.

"The first carload of gasoline obtained from independent sources by Portland dealers to help relieve the shortage in Oregon was wired for and purchased without definite knowledge as to the exact cost. It was handled at the branch house of W. H. Wallingford at Corvallis. The cost of this gasoline for delivery at Corvallis was 38 cents per gallon. When it arrived there one of the gasoline companies cut its own regular price 2 cents per gallon and sold gasoline at 24 cents per gallon, making a difference of 14 cents per gallon between what this carload had to sell for and what gasoline could be purchased for from regular sources, which had previously been suffering from a 'shortage.'

"Despite this fact, farmers and customers in general took every gallon of the carload at 14 cents more per gallon.

"One member of the dealers' committee went to Dallas and found that Mr. Sims, representing a gasoline company, had made statements to the mayor, garage men, dealers and public that the gasoline shortage would continue until September. This caused dealers of Dallas to get together and order a carload through the Dealers' Motor Car Association.

"Early on the morning of the very day this carload arrived, one of the gasoline companies started filling dealers' tanks, and did fill all but two, so that the carload of gasoline could not be handled. Despite this, farmers and the public in general took the whole carload shipment in drums at 3 cents more than the regular price.

"At Corvallis one of the gasoline companies informed Mr. Whiteside, a dealer, that the shortage would continue until November 1. The moment gasoline was imported by the dealers, however, this company began to supply gasoline freely.

"Another member of the committee went to Hood River and found that after being entirely out of gasoline for several days dealers there had decided to get together and formed a deposit to the Dealers' Motor Car Association so as to get a carload of the independent gasoline it was importing. Thereupon they were notified by the gasoline company that a carload would be there in the morning. Two carloads were sent and the dealers were notified there would be no further shortage of gasoline.

Report No Shortage Elsewhere

"This committee is in such close touch with dealers in the outside territory and their interests are so bound together that these occurrences throughout the state are quickly reported to the committee. Moreover, Portland dealers returning from trips to their factories are constantly bringing back reports on conditions elsewhere through the country. These reports show there is no shortage elsewhere than on the Pacific coast.

"However, we do not have to go outside our own committee for illustration as to how the gasoline shortage is operating here. Monday morning a week ago one of the oil companies filled the tank of the Manley Automobile Co. and notified Mr. Manley that it would keep his tank full for the entire Shrine week. Another member of the committee, C. L. Boss of the C. L. Boss Automobile Company, was rationed by another gasoline company during the entire week, which fact was not mentioned until the end of the week to see how fairly and impartially gasoline was being distributed, even to the committee itself.

FAVOR LICENSE FOR MECHANICS

Hartford, Conn., July 6.—In the opinion of a number of Hartford dealers mechanics should have a license and be able to pass a satisfactory test. This state of mind is due to the fact that considerable labor of poor quality has found its way into the ranks and as most of the shops have had a great deal to do high wages have been paid for the near mechanics. The matter is being seriously considered. Fifty dollars a week is a fair week's pay for the average Hartford mechanic. Labor charges in the garages run from $1.25 to $1.50 an hour.

Used Car Market Is Examined by Dealers

Shrewd Practices of Buyers Brings Acute Peril to Firms Making Undue Trade Allowances

BLOOMINGTON, Ill., July 6.—When the shrewd seekers after new automobiles go so far as to buy a used car for the special purpose of trading it on a new machine, it becomes high time for dealers to get together to see who are the better salesmen, the men on salary, employed by the motor firms, or the clever public, ever anxious to slip something over. This is the opinion of the Bloomington Automobile and Tractor Association members and they are a unit in agreeing that the time has come for uniformity of action, not only in this city, but in the state and nation as well.

It is the belief here that it is time to call a halt upon the policy of allowing extravagant values for second hand cars. Many owners of such cars, desirous of obtaining a new one, have been highly successful in an individual auction, inducing the various dealers to bid against each other until finally some one goes so far as to allow almost if not quite as much as the car cost when new, thereby sacrificing the major portion of the commission upon the new car taken in exchange for the old.

Should Cease High Bidding

The problem to be solved lies in the most effective means of getting the dealers of each community to cease making such suicidal bids. The Bloomington dealers are now wrestling with this problem. Each is suspicious of the other and each accuses his competitor of going to the extreme. It is always a case of the pot calling the kettle black. No one will admit that he is guilty of this ruinous policy and it is always the other fellow. In the meantime, the evil continues, the dealers lose money and the public that profits richly by this ridiculous policy, chuckles in their respective sleeves.

The men who pay the huge allowance for the used car must of course stand the loss that ensues and the competitors who were more conservative are in a position to smile over the error. But when this practice is repeated, day after day, and one-half to three-fourths of the firms are guilty to a greater or less degree, the aggregate loss each year is enormous. In the face of such a deplorable condition and the dealers at enmity with each other, because of its continuous practice, what can be done to remedy matters? What kind of an agreement can be prepared which will be binding upon all and which will enable all the dealers to make money? In the language of Kelly of Kansas City, "there's a way," but who can point it out? The crest has been reached in the value of used cars and their value is certain to decline from now on, due to the increasing output of new cars. More conservative allowance is imperative.

Two National Commercial Car Organizations Formed

National Assn. of Commercial Haulers and Motor Truck Assn. of America Inaugurated

CHICAGO, July 1—Two national motor truck organizations, the National Association of Commercial Haulers and The Motor Truck Association of America, were formed here to-day during the national convention of the National Team & Motor Truck Owners' association. The association of commercial haulers includes only those truck owners who sell transportation as a business while all owners of motor trucks, irrespective of their business, are eligible to the Motor Truck Association of America.

Affiliated With Other Associations

The new National Association of Commercial Haulers was formed by C. R. Collins, secretary of the Pacific Draymen's association, which has 2,200 members in the state of California and is affiliated with other cartage associations on the Pacific coast with an additional membership of 2,200, making 4,400 members in all on the Pacific coast alone. The Pacific Draymen's association has been a going organization for several years and its secretary attended the convention of the National Team Owner's association with a view of affiliating the two associations. In conjunction with the Detroit Transportation association, the Pacific interests joined the National Team Owner's association in a body, and during the last day of the latter's convention requested that that association adopt a modified constitution based on that of the Pacific Draymen's association. This was denied, so that Mr. Collins, together with Judge Sandborn of the Cleveland Cartage association, formed the new National Association of Commercial Haulers without affiliation with the National Team Owner's association. Mr. C. R. Collins, with offices at Los Angeles, is the secretary of the new association which will devote itself exclusively to the problems of the commercial haulers.

Believing that besides the need for a national association of commercial haulers to nationally stablize haulage rates and methods, there is still other national problems including motor truck legislation and truck highways. T. D. Pratt, secretary of the Motor Truck Association of America; E. D. Fleming, secretary of the Pennsylvania Motor Truck Owners' Protective association, and Tom Snyder, secretary of the Indianapolis Highway Transport and Terminal association, joined interests to form a national association of all classes of motor truck users. The three organizations represented by the men mentioned have over 1,500 members who either operate trucks for hire or use them for delivery in their own businesses. The new association will operate under the charter of the Motor Truck Association of America and the New York body, which has carried that name for the past ten years, has become a local of the national organization and will be known as the Motor Truck Association of New York.

A future meeting to elect permanent officers and adopt a constitution and by-laws will be held at Atlantic City on Monday, August 30.

HARDWARE MEN IN ACCESSORIES

Buffalo, July 6—Hardware dealers throughout the nation may enter the automobile accessory and supply selling business on a large scale if recommendations made here at the annual convention of the National Retail Hardware Dealers' association are observed.

In a special convention bulletin issued here it was strongly recommended that the hardware dealers were strongly urged to enter the accessory and supply business on a large scale. This bulletin said in part:

"You are in a better position to cultivate the trade of motorists than any other class of trade. You have an organization backed by years of success selling a line similar to that of motor car accessories; you have the necessary financial credit to enable you to buy right and above all else you have the ability to establish the line a little at a time on such a sound basis that it will continue to grow and add to your profits.

Advocate Standard Articles

"In selecting your stock, great care should be exercised in getting as nearly standard articles as possible. Then talk about them—make every automobile owner you know realize that you believe the oil and tires you carry are the best on the market. Pretty soon they will be coming to your store because you have the stock and because your stock is standard.

"Automobiles are long past the experimental stage and the season is every year getting longer. Cars are brought out earlier in the spring and run later in the fall. They have come to stay with us a long time and many accessories must be bought. The question is: Who's going to sell them?"

CALIFORNIA ON GAS RATIONS

Los Angeles, July 6—Gasoline rationing is now in effect here and in the surrounding territory. The regulations have been imposed by the oil companies. Some have placed a limit of five gallons on passenger cars as the maximum sale at any one time. Others have set the limit at one-half the capacity of the car tank. Motorists are finding that the only way to beat the restriction is to alter the gasoline gauge so that it does not register correctly. Supply station operators claim that the Standard Oil Co. has limited them to 20 per cent of former supplies. Tank drivers have told they had instructions to cut all requests 10 per cent. This has resulted in some dealers placing their request high enough so that after the 10 per cent is deducted they still get enough gasoline to meet requirements.

Geologist Says There Are 32 Miles of Oil-Shale in Texas

States There Is Sufficient to Yield 290,000 Barrels Per Day for 500 Years

SAN ANTONIO, Tex., July 6.—According to Captain Jay Turley, geologist, who has just finished making an investigation of the shale deposits of this region, there are thirty-two square miles of shale in the Somerset oil field, situated just south of San Antonio. He says that figuring each ton of shale to produce one barrel of oil, the daily output from the field would be 290,000 barrels of oil a day for 500 years. A refinery handling this quantity of shale oil would produce 25 per cent, or 50,000 barrels a day, of high grade gasoline and 120,000 barrels of lubricating oil, besides other by-products, which includes kerosene, paraffine wax, asphaltic residue and then allowing 3 per cent for loss in treating of the total amount of producing. Plants now in operation in different parts of the United States will bear out these figures, says Captain Turley.

Shale Resources Not Developed Yet

"The development of shale resources in Southwest Texas is a part of the oil industry which has not been entered into as yet and may not be for a long time," Captain Turley declared, "but it is one of the possibilities which will undoubtedly be resorted to on account of the overconsumption of oil and is also one of the most valuable resources of Southwest Texas."

His figures are based only on the territory embraced in the Somerset field which has been proven to contain this shale, or what is called the Taylor marl. He declares that an area of 50 square miles has been proven to contain this shale. In reducing his figures to acres there are 32,000 square acres and with the shale running 400 feet in thickness as has been borne out by tests all over the field, his estimation makes 12,800,000 acre feet of shale in Somerset field alone. He then reduces this figure to the number of tons to the acre, which amounts to 38,400,000 tons over all of the field. Basing the remainder of his figures on this grand total, is what determines the actual production of the field at an average of one barrel to the ton of shale, which is said to be a conservative estimate of its production.

Deeper Shale Rich in Oil

In handling this shale for oil production it would be necessary to mine much of it, but that would be practical, he says. The depth of it ranges all the way from surface outcropping to 1100 feet, which is about the average depth for production in the Somerset wells. These wells produce an average of 10 barrels of oil a day. This is believed due to the fact that the oil bearing shale is so far from the surface that it becomes richer in mixture and throws off the oil.

Government Interested in Truck Financing

DETROIT, July 6—Government support for the motor truck manufacturer even to the extent of interesting capital if necessary, has been assured in the effort to develop the industry as the quickest possible expedient in restoring transportation conditions.

In furtherance of the government plan to keep truck factories of the country moving at top speed in the effort to increase production official representatives from Washington now are making a round of the leading factories outlining the government position and urging a speed-up effort.

Coming at this particular time, when conditions in the selling end of the industry are described as bad, news of the government's attitude will have a tendency to arouse manufacturers and dealers to enthusiastic effort. A prominent Detroit dealer, who handles what probably is the best known truck on the market, sounded the keynote when he declared that while business to-day is "rotten" the attitude of the government strikes a welcome note and insures a sharp break upward in the near future.

There is no denying the fact that the truck business to-day is experiencing a slump that is having a bad moral effect in discouraging dealers and which in turn has made its influence felt keenly in the manufacturing end. The slump is attributable solely to the tangled traffic situation and not in the least due to the tightening of the money market, according to leading men in both ends of the industry. With the freight traffic situation in its present shape leaders in all lines of industry have been halted and without the materials for production have no use for trucks.

A striking example of this is furnished here by a large coal company which uses trucks exclusively in deliveries. The president of the company told the dealer in the truck he favors that he would be able to use five new 2½ and 3-ton trucks if he could get coal in sufficient quantity to meet the demand. An automobile manufacturing company which has been a big buyer of trucks for hauling parts and materials also has ceased to be a consumer for the simple reason that the parts manufacturers unable to secure raw materials can not keep the factory supplied in sufficient quantity to necessitate the continuance of the automobile factory's larger truck fleet. Until such time as those parts can be secured in sufficient quantity the automobile factory will confine its efforts to the operation of the trucks now on hand and will not be in the market for new ones for an indefinite period.

The bank scare dealers say was more of a myth. Ample money is available to the responsible dealer they say to permit him to continue the time payment plan of truck purchase though the fact remains that the banks have shut down on long time paper. The old system of selling trucks on from 10 to 20 months' time is a thing of the past, dealers say, and the attitude of the banks indicates that they are attempting gradually to get the 90-day basis as the credit limit. Truck dealers admit that buyers in the truck market just as in the passenger car field have numbered thousands of persons who were not financially able to own trucks but sought to take advantage of the abnormal conditions to get into the truck and cartage business for themselves by means of the small down payment and long term plan. The action of the banks in stopping this necessarily had its effect in bringing on the slump though dealers insist that freight congestion alone is responsible.

It is with the idea of aiding the efforts of the railway officials in diverting the short haul business to the motor truck and incidentally to encourage farm production that the government has stepped in with the offer of encouragement and even financial aid. The government officials with knowledge of the success attending truck transportation during the war and the fact that the motor truck proved the country's salvation when the railmen's strike was at its height have turned to the truck as furnishing the only solution to the present problem of freight congestion.

Many Miles of Lincoln Highway Are Paved

OF the 3,223 miles of the Lincoln Highway between New York City and San Francisco, there are 801 miles classed as graded dirt, 749 miles classed as graded gravel, 244.5 miles classed as natural dirt, 207.2 miles classed as natural gravel, 17 miles classed as shale, and 13.2 miles classed as sand. The remainder of the route is paved or macadamized, the different types of surfacing and the mileages being as follows: Bituminous macadam, 406.3; concrete, 317; brick, 197.8; macadam, 175; asphalt, 80.6; granite block, 7.8; and creosoted wood block, 6.6. These figures are for March 1, 1920, and were furnished Good Roads by the Lincoln Highway association.

In the foregoing classification, as well as in that arranged by States, the following explanation, supplied by Vice President Bement, of the association, should be noted:

In order to simplify the table, we have classified all forms of concrete construction under one head, "concrete." This, therefore, includes one and two course concrete construction, and whether reinforced or not or bituminously treated or not.

"Asphalt" refers only to sheet asphalt and in the table is practically all represented by city street paving traversed by the Lincoln Highway through the many municipalities. Much of the total brick mileage is also brick streets in cities.

"Macadam" refers to all forms of macadam with the exception of bitulithic or bituminous macadam. Any macadam treated with anything besides water is included under "bituminous macadam."

The mileages of the different types, by States, are as follows:

New Jersey.—Asphalt, 28.5; concrete, 21.2; granite block, 7.8; creosoted block, 3.6; brick, 1.9; total, 63.

Pennsylvania.—Bituminous macadam, 266.3; brick, 40.3; asphalt, 28; concrete, 19.7; graded dirt, 14; creosoted block, 3; total, 371.3.

Ohio.—Brick, 85.3; macadam, 73.5; bituminous macadam, 54; graded dirt 19.9; concrete, 8.9; total, 241.8.

Indiana.—Concrete, 54.4; graded gravel, 45; macadam, 31; brick, 28; asphalt, 6; total, 164.4.

Illinois.—Concrete, 75.8; graded gravel, 32.2; brick, 18.4; graded dirt, 17.2; macadam, 13.5; asphalt, 5.3; total, 162.4.

Iowa.—Graded dirt, 260.1; grad gravel, 106.5; brick, 15.2; concrete, 4.9 asphalt, 4.1; total, 390.8.

Nebraska.—Graded dirt, 313.2; graded gravel, 108.4; concrete, 9.6; light sand, 9.2; brick, 8.5; natural gravel, 8; bituminous macadam, 7.1; asphalt, 2.9; total, 466.9.

Utah.—Graded gravel, 54.8; natural dirt, 51; macadam, 40.2; natural gravel, 26; graded dirt, 24; bituminous macadam, 9.5; concrete, 7.9; sand, 4; asphalt, 2; total, 221.4.

Nevada.—Graded gravel, 182.7; natural gravel, 133.9; natural dirt, 101; graded dirt, 22; macadam, 12.5; concrete, 6; asphalt, 0.8; total, 458.9.

California.—Concrete, 108.3; bituminous macadam, 69.4; graded gravel, 26.3; graded dirt, 16; natural gravel, 8.3; macadam, 4.3; asphalt, 3; total, 235.6.

THIEF GETS FIVE YEARS

Detroit, July 6.—Stanley Delong, declared to be leader of a gang of automobile thieves, operating between the large cities of the central states, was sentenced to Leavenworth prison for five years yesterday in federal court. Delong was arrested by federal officers charged with having brought a stolen car from Indiana to Detroit. Upon questioning by the court he admitted having stolen seven machines. The arrest of Delong, authorities say, soon will result in the apprehension of others in the gang.

Embargo Ties Up Good Roads Improvements in Georgia

Limitation of Uses of Open Freight Cars to Hauling Coal Stops Road Work in State

ATLANTA, Ga., July 6—The embargo on road materials is in force and has been in force long enough now that a definite idea can be formed as to just what its continuance in the present form is going to mean to good road work throughout the South. It was at first thought that the Interstate Commerce Commission had no intention of holding up road work in declaring this embargo. This was naturally taken to mean that it would not affect cars used in the transportation of road building material. However, the embargo went into effect June 21, and it includes all open top freight cars, prohibiting their use for any other purpose than hauling coal.

Atlanta contractors and officials of the State Highway Department state that the embargo in its present form continued for any length of time will cause a serious setback to road work all over the South, putting an automatic halt on millions of dollars worth of contracts now in operation. In Georgia alone $7,000,000 worth of work will be affected, and a similar ratio in other Southeastern states.

Already one big plant at Birmingham, Ala., the Birmingham Slag Co., has been compelled to shut down its plant. All cars in its pits were seized for hauling coal immediately the embargo became effective, and as this company supplies a considerable amount of the road building material used in Georgia and other Southern states, the effect of the embargo will be seriously noted as soon as the present supplies of material give out.

The embargo was placed for thirty days only, but it is the general belief it will be extended and will probably last ninety days, as this much time is required by the coal mines to catch up with their deliveries.

Every effort is being made by various Southern organizations to have the embargo modified to some extent at least, as it affects all construction work, not only road building. What the result will be remains to be seen.

RUSH CHICAGO-DETROIT ROAD

Kalamazoo, Mich., July 6—R. H. Steketee, highway engineer for southwestern Michigan, is rushing the work of paving the Chicago-Detroit road in an attempt to have it completed as nearly as possible on his section by the time the snow flies. He is meeting discouragement, however, by delay in the delivery of material, especially cement. The work from the east line of Calhoun county to the pavement in Berrien County is all under contract and the major part of the grading has been done and now awaits cement to finish the job. The breaks in the pavements through the villages in Kalamazoo and Calhoun counties will be taken care of by the state and Mr. Steketee is working to the end of having this part of the work completed this year.

Detours, however, circling the unfinished parts of the pavement are kept in the best of condition and travelers in Michigan this year are not having the difficulty of previous years when no provision was made for keeping detour roads in repair. In the construction of all roads in Michigan this season there has been a most rigid inspection in order to avoid break-down of foundation. With the development of truck transportation, of which there are many lines in Michigan now making regular trips, a weakness was found in some of the previously constructed roads and close investigation showed this was due in most cases to failure of contractors to come through clean in materials used, and strictly according to specifications. All roads now built in Michigan must come up to every requirement of the engineers.

NO SUNDAY WORK IN STREATOR

Streator, Ill., July 3—Dealers in motor vehicles, proprietors of repair shops, and all accessory dealers of Streator, Illinois, agreed at a meeting held in June, to close their places of business, with one exception, during the Sundays in July, August and September. One place will be left open, each taking its turn, so that the public can be accommodated in the way of service and supplies. Due announcement will be made each week of the place to be open the following Sunday. It was felt that the opening of all places of business on Sundays, in view of the fact that there is only enough demand for service and supplies to warrant one remaining open, was unnecessary. Signatures of every proprietor were secured to the agreement.

TO FIGHT ROAD BILLBOARDS

Wilmington, Del., July 3—Delaware motorists have inaugurated a campaign against billboards at road intersections which interfere with vision. A tour of the upper part of the state has disclosed quite a number of large signs so placed at junction points—in order to take advantage of two roads—that make it impossible to detect vehicles until the intersected road is reached.

In view of the fact that the Supreme Court has held that a man can do what he pleases with his own property, as long as he does not encroach on the rights of the public or his neighbors, and as these signs are on private property, it is doubtful whether any legal action would result successfully. So the plan is to endeavor to have owners of property on which offending signs are located remove them for the good of the public.

SET DECEMBER MEET DATE

Cincinnati, July 5.—Announcement has been made by the Chamber of Commerce that the next meeting of the Ohio Automotive Association will be held in Cincinnati in December.

New York Truck Dealers Line Up for Farm Work

Metropolitan District Men Lend Aid and Support to Movement to "Motorize the Farm"

NEW YORK, July 6—Preliminary steps for an energetic campaign for the diversification of crops and motorization of farms in New York and New Jersey were taken here yesterday. Decision to act was taken at an enthusiastic meeting of nearly 400 truck and implement dealers and their salesmen who had come from points within a 100-mile radius of New York City.

Truck dealers in the metropolitan district have done little up to now in pushing sales among the farmers. They have had about all they could do to meet the demands for trucks in the cities. The demand from urban districts still is strong but they are convinced normal conditions cannot be restored in the United States until food production is stimulated.

The initiative in calling the convention which was held at the Waldorf-Astoria yesterday was taken by the Motor Truck Association of America and Theodore Pratt, secretary of the organization, presided. He pointed out to the dealers the trend of labor away from the farms and declared the decrease in food production could be overcome only by motorization and diversification of crops.

Talk by Practical Farmer

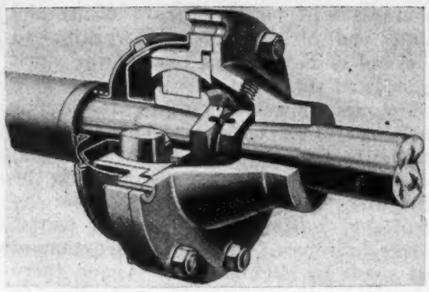
In introducing A. R. Kroh as the chief speaker, Mr. Pratt said he could speak from practical knowledge because he had been in the truck business and was owner of a large ranch in New Mexico. Mr. Kroh was described as the best informed man in the country on motorization of the farm.

Mr. Kroh began his address with a summary of the serious situation resulting from the concentration of the major part of the population of the country in the cities instead of on the farms. He described agriculture as the mother in industry and asserted that without larger food production normal conditions never could come back in the United States. As far back as 1900, he said, the United States imported as much food as it exported and since then the number of rural residents has steadily declined until now only 13,700,000 are actually producing food.

Mr. Kroh pictured graphically the difficulties which beset the farmer and asserted that he had reduced the acreage under cultivation because he was actually losing money. He cited facts and figures which prove his contention, adding that all the farmer asked was a decent profit. One of the best ways to assure the farmer's financial success, he declared, was to provide him with power machinery to cut the costs of production.

Pick Universal Joint

The Pick universal joint manufactured by the Carl Pick Co., West Bend, Wis., incorporates several well known principles into a new construction that might be described as a sliding block universal joint. The propeller shaft is held between four sliding blocks. These blocks fit the square section of the shaft and the exterior of the blocks form a circular section which fits within the slots of the drop forged housing. Each of these four blocks forms a perfect quadrant and as each block is a bearing, the four form a true circular bearing. The four blocks which are designated as segments rest on the four bearing blocks, and the outer faces of these blocks form a rectangular section on which the drive shaft bears. The segment blocks drive



Pick universal joint

with the shaft and as the shaft is caused to move backward and forward, as in the case of the Hotchkiss drive, these four blocks move with the shaft. With this construction the splined section of the shaft is brought up and beyond the center of the point.

New Ford Pistons

SLIGHT CHANGE IN FAMOUS MODEL T

The new Ford Model T pistons have been lightened by approximately nine ounces, thus reducing the vibration and giving a better balanced engine. The new piston has no reinforcement on the bushing bosses nor around the skirt. If these new pistons are installed in an old engine, all four must be replaced, as a combination of the two will throw the engine out of balance, due to the difference in weights.

Due to the lightness of construction, the Ford Motor Co. recommend that no attempt be made by dealers to renew the bushings until some means is provided to support the bosses when removing and replacing these bushings. This fixture is being designed and it is advisable to install an entire new piston until such time as this tool can be secured.

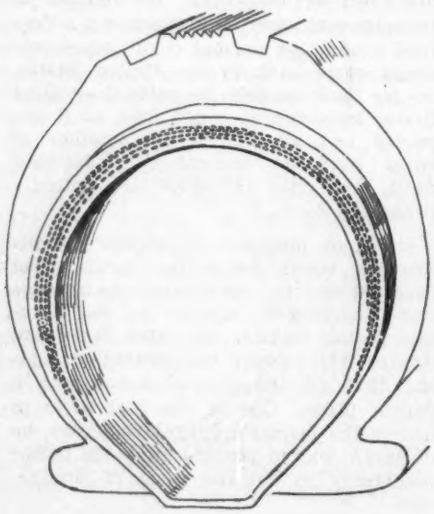
Loadometer for Weighing Trucks

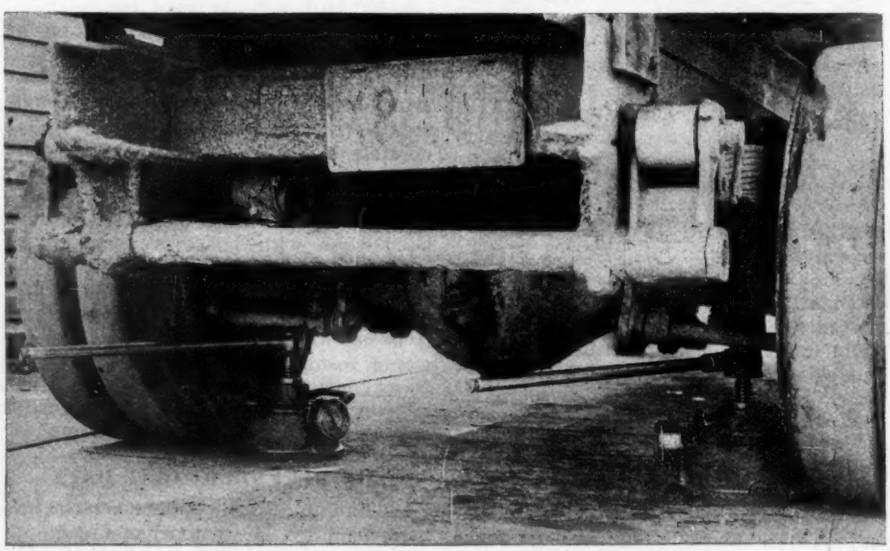
THE Loadometer is a device for protecting our roads against overloading. There is no doubt that great damage to the roads is caused by overloaded trucks. For this reason many of the states have enacted laws restricting the load which may be carried per inch width of tire. In the past if the road commissioners stopped a truck which they suspected of carrying an overload they had no accurate means of checking the load. The instrument shown herewith was designed and built so that the load can easily be checked at any time in any place. It is simply slipped under the truck axle and jacked up by means of the screw jack mounted on the plunger of the Loadometer. The base of the instrument is an oil-filled cylinder in which the plunger operates, and the weight carried by the plunger is indicated on a high pressure gage connected to the oil chamber. By using a pair of Loadometers under the rear axle of a truck—the greatest weight of a loaded truck is always carried by the rear axle—the maximum load per inch of tire width is easily determined. The instrument is compact and portable, as the jack handles can be detached and a pair of the Loadometers can easily be carried about in a small car. The Black & Decker Mfg. Co., Towson Heights, Baltimore, Md., have built instruments of this kind that have been used by county and state road commissioners for several years and have now decided to put these instruments in production.

A close-up view of the Loadometer, showing the dial which indicates the weight. These instruments have been used for several years by road commissioners and it has been decided to produce them in quantity

L. & R. Inner Tube

A new inner tube has recently been patented by Paul E. Luebcke, which it is claimed is blowout proof, makes the outer casing less liable to get stone bruises and still possess the same riding qualities as are obtained using any kind of pneumatic tires because the same amount of pressure can be used in this tube, the same as any other inner tube. The tube is comprised of an outside and inside wall, the inside wall being a ring of elastic material and the outer wall being of elastic and inelastic material permanently connected as shown.





To ascertain the weight on each truck wheel, a Loadometer is slipped under the rear axle and jacked up by means of the screw jack

An Interesting Development in Engine Construction

The New Caunt Design Is of the Four-cycle Type But Has Several Features Which Liken It to the Two Cycle Engine

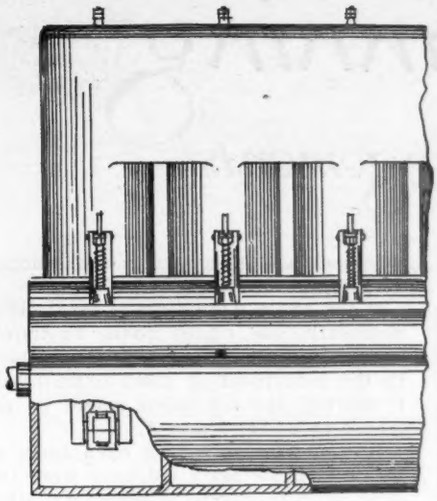


FIG. 1.

RARELY, in this day of high speed engines, does the designer or inventor proceed outward, along different lines. Most of the developments in gas engine construction have been but mere changes in the fundamental gas engine construction, as is employed on practically every motor car in use to-day. Overhead valve construction is but a change from the old L-head construction, that is, the same characteristics of the gas engine are not changed by the change in location of the valves from the L-head position to the over-head position; likewise such improvements and changes in lubricating systems from circulating splash to full force feed do not change the engine from its fundamental characteristics; placing the camshaft overhead or retaining it within the crankcase does not alter the principle of the gas engine.

Caunt Engine a Departure

One of the recent, what we might call radical changes announced is that made in the Caunt engine, Calgary, Alberta, Canada. This engine is of the four cycle type but incorporated with it are several features which liken it to the old type of two cycle engine, in that the crankcase is used for an initial compression. Individual chambers are used for each crank rod and piston and part of the mixture is taken in first through this chamber compressed by the downward stroke of the piston, which when reaching a certain position in the cylinder bore, uncovers the port in the block and the compressed charge in the crankcase then escapes upward into the combustion chamber proper. The illustrations of the engine which are shown herewith are necessarily incomplete in detail and the lack of refinement is deliberate for the drawings are thereby the more easily understood.

Fig. 1, shows the two stroke cycle crankcase construction, the auxiliary valve is shown at each cylinder. This valve is mechanically operated and allows the gas to be drawn into the crankcase on the upward stroke of the piston for that particular chamber.

Pressure in Crankcase

Fig. 2, depicts the completion of the power stroke; the crankcase valve has just been closed for this stroke allowing the pressure to build up in the crankcase as the piston moves downward on the power stroke. The exhaust valve has started to open just previous to the piston uncovering the scavenging port, thereby relieving the combustion chamber of any pressure. The scavenging ports being uncovered by the piston, the compressed air in the crankcase, rushes into the cylinder and fills the space above the piston head. The piston now returning on the scavenging stroke together with the full volume of fresh compressed air drives out of the cylinder head all the spent gas and leaves only clean air in the combustion chamber at the end of the scavenging stroke. This is one of the advantages of this engine. Instead of leaving approximately 20 to 25 per cent of the piston displacement volume full of a carbon gas that has no power, pure air is left which helps to supply sufficient oxygen to burn the mixture.

Fig. 3, shows the completion of the exhaust stroke and the exhaust valve has just closed. The intake valve which is not shown is just about to open. The crankcase valve has been closed for the first part of this stroke to allow the piston to move up sufficiently to close the scavenging port. The crankcase valve remains open until the completion of this stroke and stays open during the charge and compression stroke when it closes again for the period of the power stroke and first part of the scavenging stroke.

In Fig. 4 is shown the completion of the charge stroke with the intake valve just closed. For the purpose of supplying breather action the crankcase valve is held open during this stroke, and the air in the crankcase is therefore under atmospheric pressure. It is at this point of the operation that the compensating action takes place, for with the ordinary engine running with a partially close throttle it is impossible for the piston to draw in a full charge. With the scavenging port uncovered at the completion of the stroke sufficient air will issue into the cylinder, satisfy any vacuum, and bring the whole contents of the cylinder up to full atmospheric pressure. The air that lies on top of the piston head acts merely as a packing material, so that on the return or compression stroke a smaller throttle charge is given as high a compression pressure as a full charge of mixture would if the engine was running with throttle wide open. So it is possible therefore, for the throttled charge to get the full benefit of maximum compression pressure, insuring that any charge will deliver full value for its size.

The Scavenging Duct

Fig. 5, shows the completion of the compression stroke with the crankcase valve just closed in preparation for the power stroke. Here the air in the crankcase will be compressed during the power stroke for scavenging purposes.

In Fig. 6, is shown the scavenging duct which communicates with the crankcase as in a two stroke cycle engine. The facing of the scavenging duct around the circumference of the cylinder is shown in Fig. 7.

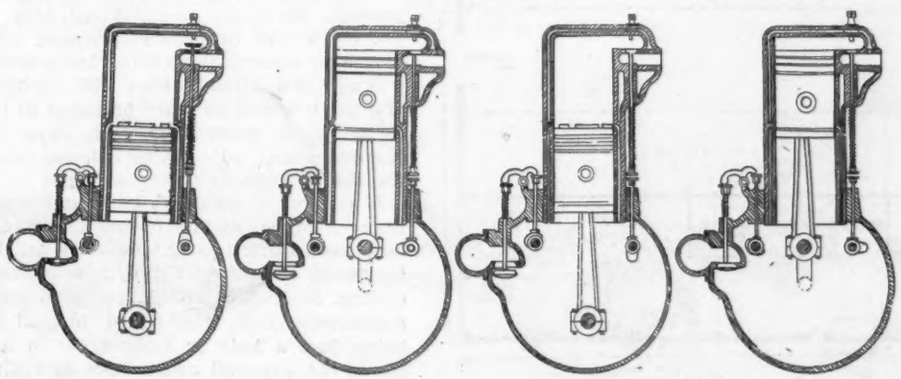


FIG. 2. FIG. 3. FIG. 4. FIG. 5.

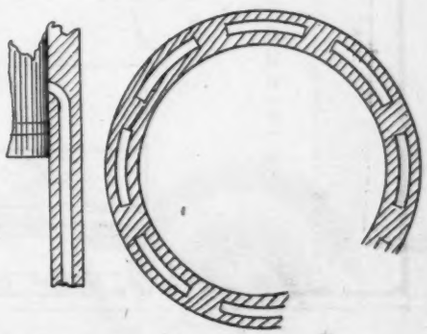


FIG. 6. FIG.

Garage Planning
Service Station Arrangements

CONDUCTED BY TOM WILDER

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage and readers are urged in asking for such plans to be used to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

No. 240

GENERAL GARAGE WITH LARGE STORAGE CAPACITY

We are sending a rough pencil sketch of the lot upon which we contemplate building a one-story garage. It is located on a corner, and there are no alleys on either of the other sides.

We intend to cover the entire block and are anxious to work out a floor plan with convenient arrangements for a good sized sales room, large enough to display five cars; a repair shop in which will be employed five men; a battery service room; a paint shop large enough to accommodate four cars, and a varnish room large enough for two cars. We expect to do quite a large storage business, and go into accessories extensively with a good sized accessory store, and also an office.

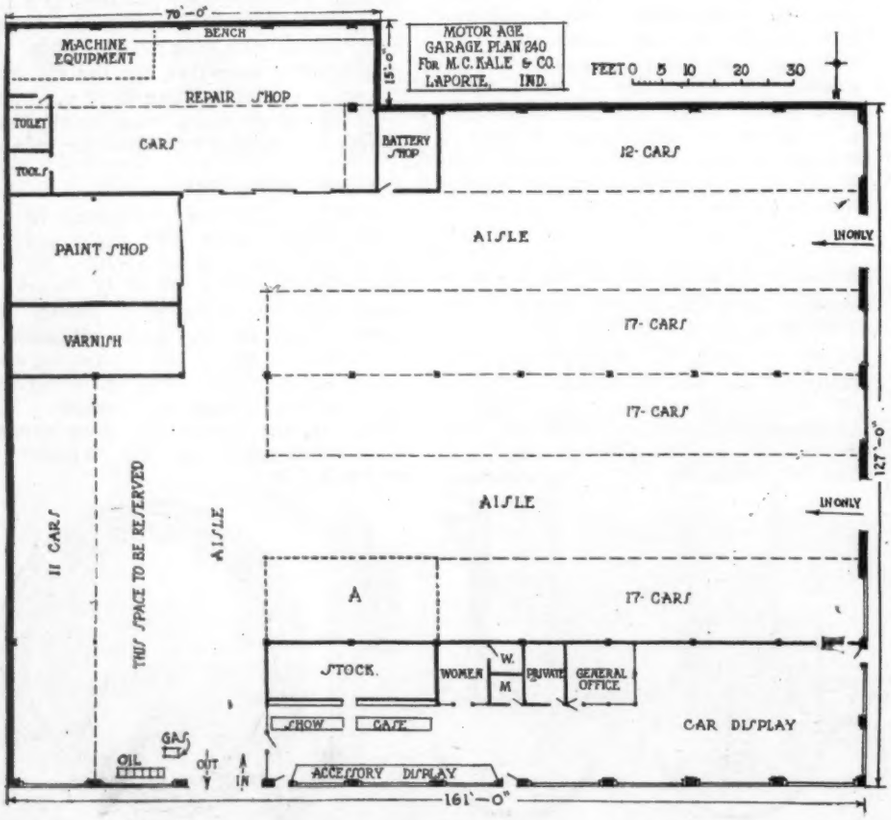
Will you outline a plan for a roof construction suitable for our garage?—M. C. Kale & Co., La Porte, Ind.

The ample proportions of the lot make an almost unlimited number of arrangements possible. The first inclination, however, where large storage space is desired and where a 127-ft. width is available, is to lay off a 100-ft. strip for storage and save the 27-ft. strip for the other departments. This, virtually, is what we have done in the west part of the building; but, on the east end, we have cut off 50 ft. to give an entrance on the front where cars will have to pass the accessory store.

If the car display room is larger than necessary, the offices could be moved further to the west, giving more space to the stockroom or more office space. If desired, the stockroom might be enlarged to fill the space A.

It would be well if an open space at the left of the main entrance were left clear of cars except when every other space is filled. This space always is very valuable for emergency repairs and adjustments, and anything that would ordinarily detain a car in the aisle where it would obstruct car movements.

The roof should be supported by trusses, the abutting ends of which rest on the row of posts through the center. These may be any style from the round top lattice truss to the flat Howe type. One of the round or pointed top varieties would seem better as affording more positive drainage than the flat kind; but if the flat ones are used they may be set lower in each succeeding position, or they may be designed with a pitch in the top member and all the bottom members on a level. The latter would be better when it comes to hanging pipes, overhead tracks, etc.



No. 240. General garage with large storage capacity

No. 241

FRONT ELEVATION FOR 66 FT. BUILDING

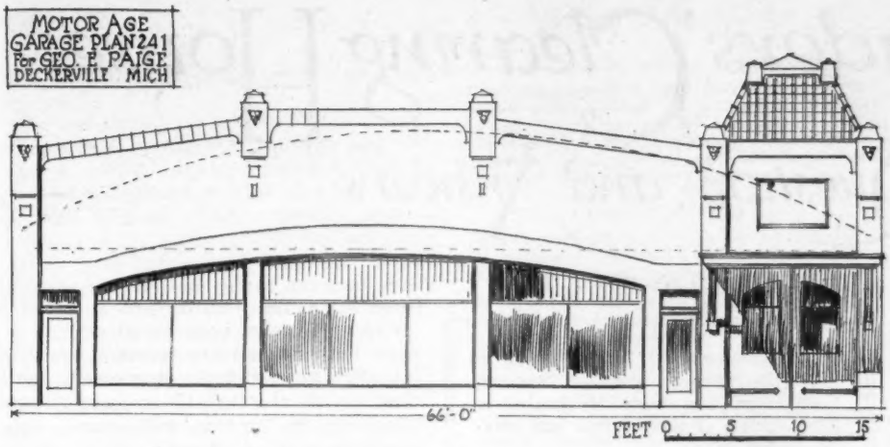
We are going to build a garage. In fact, the walls are up, with the exception of the front. Have planned the roof, but have done nothing regarding inside arrangements and the front. Would like an outline of a suitable front and a plan for utilizing to the best advantage the inside space.—George E. Paige, Deckerville, Mich.

We are not publishing plan of your garage because your layout fills the bill very nicely. The suggestions are slight and are shown on the layout.

A front elevation which would fit your requirements is shown, and is one which would be attractive on your street and which any town would be proud to possess. We would prefer it built of dark red brick—red or brown—trimmed with cream or other light-colored terra cotta.

Since you already have the building started, it would be more practical to try to get some stock terra cotta caps for the piers and use cream colored brick for the balance of the trimmings.

If you place the doors back at the garage entrance, as you indicate, it would be a good thing to use face brick on the inside of the driveway, with a beamed ceiling, so that it would present a good appearance from the street instead of being just a hole in the wall. To improve the external appearance and also have an entrance handy to the accessory



No. 241. Front elevation for 66 ft. building

store, we have used small entrances, one at each end of the showroom.

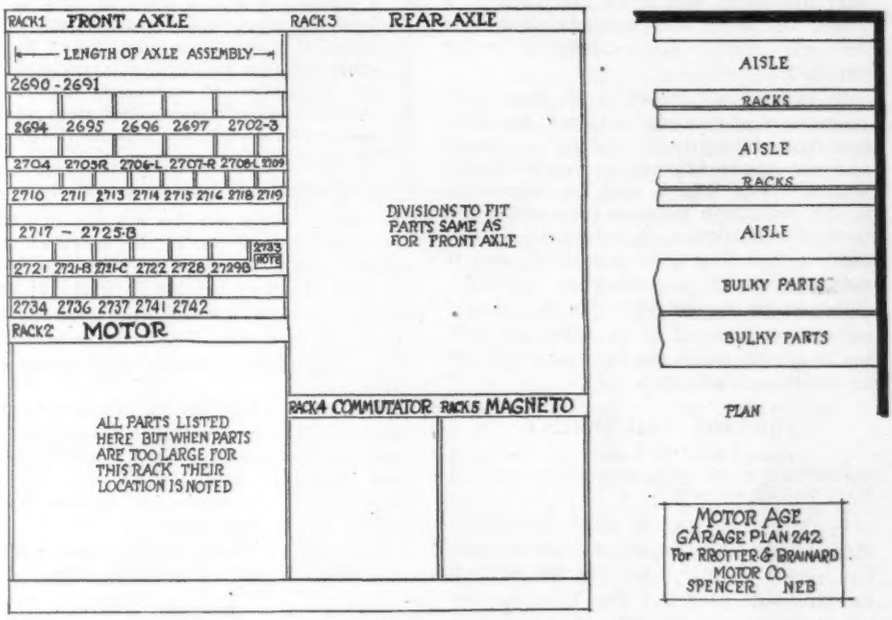
No. 242

ARRANGEMENT OF RACKS AND BINS IN STOCKROOM

Being about to install racks in our new stockroom, we would highly appreciate your suggestions as to rack arrangement. We have Ford and Fordson contracts and carry a small stock of Maxwell parts. Our stock of accessories is about that of the average up-to-date garage. Our stock averages about $12,000.—Krotter & Brainard Motor Co., Spencer, Neb.

The ready made racks and bins are very extensively used by Ford dealers, but if you wish to make your own racks a little study of your stock and sales will enable you to make up bins that will be very economical of space and handy as to arrangement.

The bins can be arranged with aisles between, as shown in our plan. These aisles should be 30 in. wide and the ordinary bins should be 12 in. deep, their breadth and height to be determined by the size and number of parts they are to contain.



No. 242. Arrangement of racks and bins in stockroom

This layout makes it possible to classify the parts and label the boxes with the part numbers in the same order that they are in the maker's price list. When a part is encountered that is too bulky to put away in small boxes, a note will tell where it can be found.

REFUSE OIL TO MUNICIPALITIES

Los Angeles, July 6—Public institutions of the State of California have been affected by a gasoline, distillate and crude oil rationing system. According to State Purchasing Agent McMillin the oil companies have refused to bid on supplying the state institutions with these oil products during the next three months period. Oil that is supplied will have to be at the market prices. This attitude may result in a complete change in the heating and operating systems at the various institutions.

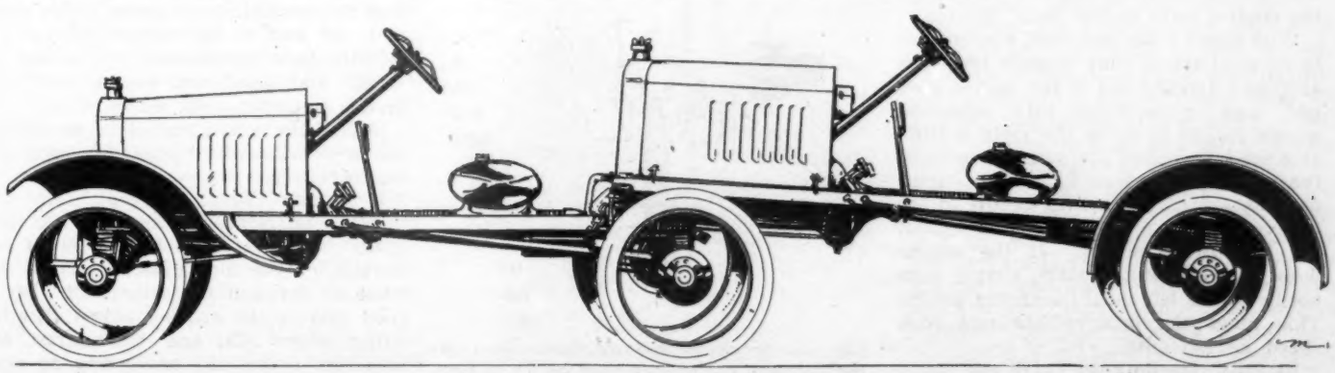
One Man Delivers Two Ford Chasses With This System

Time and men being valuable in the automotive manufacturing and delivering business now, when rail transportation is at a low ebb, the Ford company has hit upon a novel way of transporting chasses of the Ford.

The method may be observed at almost any of the assembling plants of the company and is one of regular practice at the Chicago plant, particularly when a lot of chasses may be going to a freight yard for shipment, or perhaps to some nearby distributor.

The rear fenders of one chassis are removed, likewise the front fenders and wheels of another. Then the latter is hoisted so the front axle will rest on the rear portion of the frame of the other chassis. It is strapped in place and the fenders laid on carefully.

By this means one driver can successfully deliver the two chasses and some gasoline and more or less wear and tear are saved.



The Readers' Clearing House

Questions and Answers

CONDUCTED BY ROY E. BERG
Technical Editor, Motor Age

THIS Department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by some one else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

HUDSON CARBURETION

Q—Publish power curve for a Hudson 6-54. What speed should this car make under favorable conditions?

2—This car is equipped with a Zenith carbureter, constant feed type. Would you advise changing it in order to get more mileage? At present I am only getting about 5 to 6 miles per gallon city driving and 6 to 7½ country driving. —F. T. Caulkins, Rockford, Ill.

1—We have not the information in our files from which we can furnish a power curve. Under average conditions this car should make about 60 miles per hour.

2—If this carbureter is old it is very probable that the engine is not handling the fuel efficiently. This car is heavy and has about 420 cu. in. displacement, which means that it will be impossible to get very good mileage even under the best of conditions. It would be a good idea to install a new carbureter and if possible secure a hot spot manifold. There is no reason why this car should not get at least 12 or 14 miles per gallon if all the parts are in good condition and properly adjusted.

JOHNSON ADJUSTMENT

Q—Instruct how to adjust the Johnson carbureter on a 1916 Reo.—Raymond T. Nall, Centertown, Ky.

1—Do not attempt to make the adjustment by changing from the previous one, but screw needle valve No. 99, Fig. 1, lightly to its seat and also turn in slow speed screw No. 14 until it is entirely closed, leaving the carbureter completely shut off.

Turn needle valve No. 99 to the left one and one-half turns, start the engine and allow it to run until the water in the radiator and intake heater jacket is at the normal running temperature.

See that the carbureter adjustment on the switch bracket is turned to the "Run" position, that this adjustment gives full travel to the carbureter choke lever No. 120 in both directions so that it will strike each end of its slot and that it is at the front end of the slot with the control lever in the "Run" position.

With spark lever advanced one-quarter of its total travel snap throttle lever No. 183 open quickly and if the engine does not miss or back-fire turn adjusting needle No. 99 in or to the right a little at a time, repeating the quick opening of the throttle lever each time, until engine does back-fire. Then turn needle to the left ⅛ to ⅛ turn or just enough so that the back-firing ceases. If the engine does back-fire at the start, simply turn needle to the left until backfiring ceases. This gives the intermediate and high speed adjustments.

By fully retarding the spark and throttle levers and screwing out the throttle lever stop screw No. 17 the speed of the engine with closed throttle can be brought down as low as desired. If the engine does not run smoothly turn idling screw No. 14 to the left until it does. The usual idling speed is approximately 250 r.p.m.

Remember that all of these adjustments are to be made with the engine at running temperature, and steering column adjusting lever on "Run." When adjustment is satisfactory tighten lock screws No. 16 and 170.

This setting should give a good average between rapid acceleration and high economy. The two do not go hand in hand. The most economical setting will give only normal acceleration when the accelerator pedal is depressed gently and in case the throttle is slammed open suddenly the engine will starve, especially if it is at all cold. To accelerate at low speeds, with an economical adjustment, the throttle must be opened slowly, thus feeding only the amount necessary and vaporizing it more perfectly by drawing it past the small opening around the throttle valve, or churning it. Rapid acceleration with a wide open throttle can only be obtained by excessive use of gas, no matter what make of carbureter be used, and it cannot be done economically.

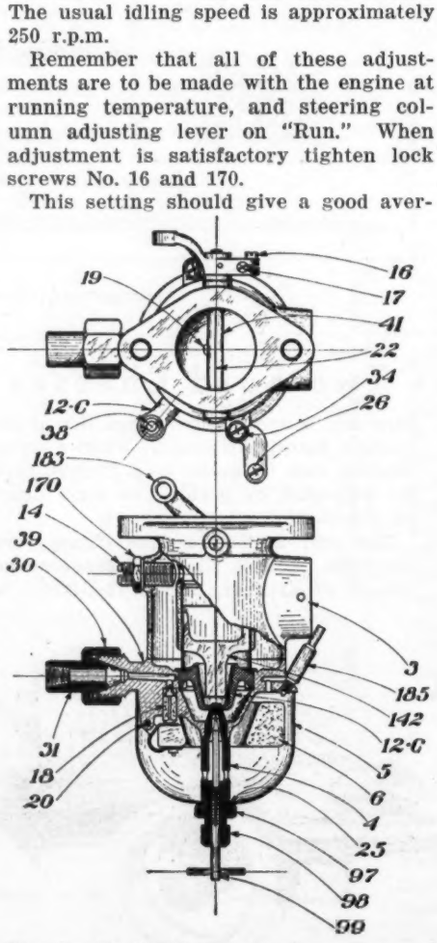


Fig. 1—Sectional and airplane views of the Johnson carbureter used on 1916 Reo

HOLLEY CARBURETER

Q—Would the power and pep of the Ford Holley carbureter be increased if the late "Q" strangle tube were installed? —L. P. Lennard, Kirk-McKern Motor Co., Albany, Ore.

The carbureter companies are making recommendations for changes on their carbureters to meet with the present fuel condition and we therefore advise writing the Holley company and get their opinion.

MARVEL CARBURETER ON BUICK

Q—Instruct how to adjust Marvel carbureter on same car.—F. Daricek, McNary, La.

The standard adjustment of the carbureter which will give the maximum mileage with the best all around driving is as follows: The gasoline needle valve at the bottom of carbureter (Fig. 4 (3) should be open approximately at one full turn, and at the end of the air adjusting screw (5), just above the float bowl, should stand flush with the end of the ratchet spring (4). To get this result, adjust as follows:

Turn the gasoline needle valve on bottom of carbureter (3) to the right until it stops, and then turn back to the left one complete turn. Make sure that the air adjusting screw (5) is flush with the end of the ratchet spring (4).

With dash adjustment (6) turned to "Hot," start and run engine until the intake manifold feels warm.

Retard the spark and close the throttle on steering wheel gradually until the engine idles.

If engine tends to stop when the throttle is closed, either the throttle idling screw (7) is not screwed in far enough, or the air adjusting screw (5) must be screwed in farther. To get a good idle of the engine, adjust throttle idling screw (7), and also adjust air adjusting screw (5) as loosely as pos-

sible without making the engine miss or run rough.

To test the above adjustment, the engine should accelerate from an idle as follows: With advanced spark it should accelerate without a back fire on both hot and cold air. With retarded spark it should accelerate on hot air without a back fire, but should back fire when accelerated on cold air.

These accelerations should be tried several times to make sure of the adjustment. If the engine does not back fire with retarded spark and cold air, the carbureter is set too rich and this can be remedied by turning the needle valve (3) to the right and at the same time tightening the air adjusting screw (5) to keep the idle until above conditions are met.

On the other hand, if the engine back fires on advanced spark and cold air, the carbureter is too lean and may be made richer to meet the above conditions by turning the needle valve (3) to the left and loosening the air adjusting screw (5) to keep the idle.

The carbureter should be checked frequently to see if the above conditions are being obtained, and the temperature of the air entering the carbureter should be regulated to give the desired results while driving.

In starting the engine, turn the dash adjustment (6) to "Choke" until the engine starts, and then turn it immediately to "Hot." It should be left at "Hot" only long enough for the engine to become well warmed up, when the dash adjustment should be turned to "Cold" and left in that position. These directions apply to normal temperatures and weather conditions, and the driver will soon learn to handle the dash adjustment to take care of colder temperatures.

For example, on a very cold winter day it may be necessary to drive with the dash adjustment turned somewhere between "Hot" and "Cold" all the time, the exact position to be determined by finding out where the most satisfactory performance of the engine is secured.

The adjustment should be kept as near "Cold" as good performance permits.

When the dash adjustment is turned to "Choke," both the hot and cold air inlets are shut off and only enough air enters to make a combustible mixture at a low temperature. This mixture is entirely too rich for driving.

When the dash adjustment is turned to "Hot," the carbureter is fed with hot air from the chamber around the exhaust manifold, entering at points (1) and (2). This gives a satisfactory mixture while the car is warming up.

When the dash adjustment is turned to "Cold" the carbureter draws its air from the outside, and if the carbureter itself is properly adjusted gives the right mixture for ordinary driving temperatures.

Turning the dash adjustment to a position somewhere between "Hot" and "Cold" on cold days may be done in such a manner as to fed the air to the carbureter at about the same temperature as the outside air in warm weather, thus assuring a mixture that affords both performance and economy.

To assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

CARBURETION

F. T. Caulkins.....Rockford, Ill.
Raymond T. Nall.....Centertown, Kl.
L. P. Lennard, Kirk-McKern Motor Co.....Albany, Ore.
F. Daricek.....McNary, La.

LUBRICATION

Ernest Coputo.....Washington, Pa.
Clemens T. Eger.....Denver, Colo.
Raymond T. Nall.....Centertown, Ky.
Vivian M. Duddles.....Chicago
Homer Strosnider..Clarksburg, W. Va.
W. J. Harmon.....New Hartford, Ia.
Harry Carlson.....Marquette, Neb.

THE ELECTRIC SYSTEM

F. T. Caulkins.....Rockford, Ill.
Leslie Milliken.....Saco, Me.
T. J. Raphell.....Philadelphia, Pa.
L. P. Lennard, Kirk-McKern Motor Co.....Albany, Ore.

THE POWER PLANT

L. P. Lennard, Kirk-McKern Motor Co.....Albany, Ore.
Andrew F. Davis.....Beavertown, Mich.
M. D. Worley.....Newark, Ohio
Motor Sales Co.....Hoberg, Mo.

CLUTCHES

E. Schmall.....Chicago
Main Garage.....Woodhill, Ill.

REBUILDING

The Massillon Garage Co.....Massillon, Ohio
E. A. Bradley.....Winesap, Wash.

Lubrication

OIL PRESSURE REGULATION

Q—Instruct how to prevent the oil from leaking around the main bearing next to the flywheel on a 1919 Hupmobile, Model R. It takes three quarts of oil to every 40 miles.

2—Instruct how to reduce the oil pressure on the oil pump.—Ernest Coputo, Washington, Pa.

1—If the oil is leaking out of the rear main bearing so fast that it requires three quarts of oil to every 40 miles it is very strange that there is not a serious bearing knock. The only thing that can be done is to see that all of the bearing oil passages are free from dirt and that the bearing at the rear of the crankshaft is tight.

2—The oil pump used on this car is a gear driven pump. This pump is set at the factory for the correct amount of pressure and if it is excessive now we are inclined to believe it is because the oil line is partially clogged. The pressure of the oil in this system is controlled by a spring and ball valve known as a relief valve. The pump is located on the top of the crank case at the rear of the cylinders. To regulate the pressure, loosen the lock nut and turn the pressure regulating screw to the right to increase and to the left to decrease the pressure. Diagram of the oil pressure relief valve is shown in Fig. 2.

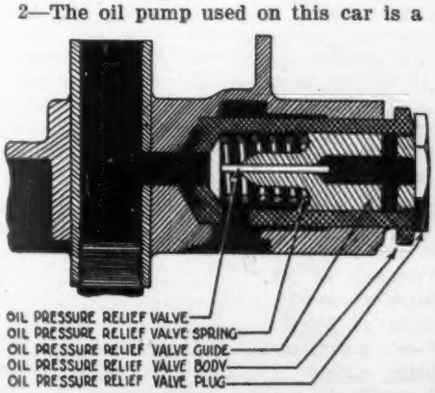

OIL PRESSURE RELIEF VALVE
OIL PRESSURE RELIEF VALVE SPRING
OIL PRESSURE RELIEF VALVE GUIDE
OIL PRESSURE RELIEF VALVE BODY
OIL PRESSURE RELIEF VALVE PLUG

Fig. 2—Sectional view of oil pressure relief valve

OIL GAGE TROUBLE

Q—A Chevrolet 490 recently equipped with a new oil pump leaks oil at the dash connection. The pipe was flared and coupled. The oil runs freely into the gage but is very slow running back. What is the trouble?—Clemens T. Eger, Denver, Colo.

According to our records the Chevrolet 490 is provided with a combination force speed and splash lubrication system, and the gage on the dash indicates oil pressure. There should not be any oil flowing into the gage at all, as it indicates the pressure actuated by the oil pressure against a column of air. Make a careful inspection of all the oil lines and the air line, being sure that all of the connections are tight. If you have a gage that has oil pumped into it and the oil will not run out fast enough you will probably find that the oil line from the gage is particularly clogged up.

OIL TROUBLES

Q—A 1919 Dodge car after standing idle for several hours seems to fill up with oil and it must be blown out by holding choker partially in and speeding up the engine for about a minute after which it runs perfectly, otherwise it will not hit perfectly under two miles. When speeded up blue smoke issues from the exhaust pipe, after it is speeded up this way the car runs perfectly. What is the cause and give the remedy?

2—What causes Overland 90 cars when running idle slowly especially on cold nights to stop and they must be choked to start otherwise they run perfectly. Have noticed this on several even after they had run as much as ten miles.

3—About how many miles per quart of oil should an Overland 90 give with rings in good condition?—Raymond T. Nall, Centertown, Ky.

1—This seems to indicate that the pistons are pumping oil. It is probably a case of the pistons being worn so badly that they are pumping oil up into the combustion chamber and when the engine is started it forces the oil out of the exhaust. It would be well to look over the oiling system and see that the amount of oil is properly regulated. In the case of mechanical difficulty you will have to have new pistons fitted to stop the oil pumping.

2—This is not unusual as there are many other cars that do the same thing. It is a case of carburetion and naturally the carbureter setting cannot be correct for all temperatures. In this case the mixture is probably very weak and in addition you may have the throttle set so low that the engine will die when the throttle is completely shut off.

3—This engine ought to get about 175 miles per quart of oil. We advise chang-

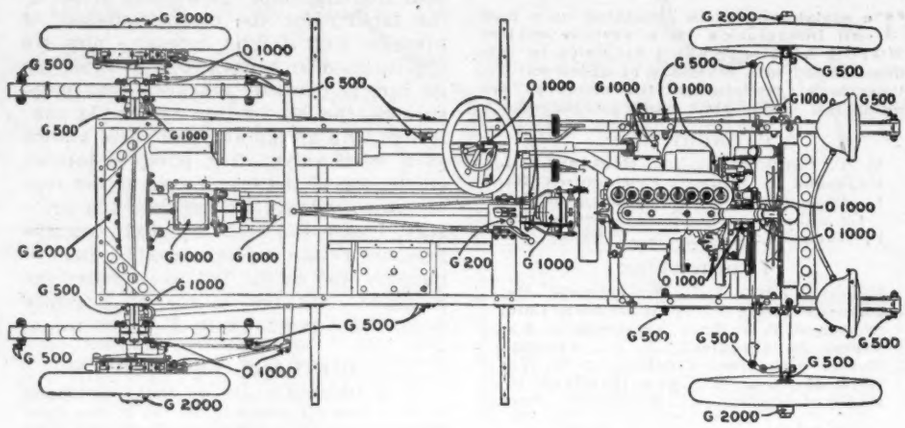


Fig. 3 — Lubrication chart of the 1914 Studebaker 4

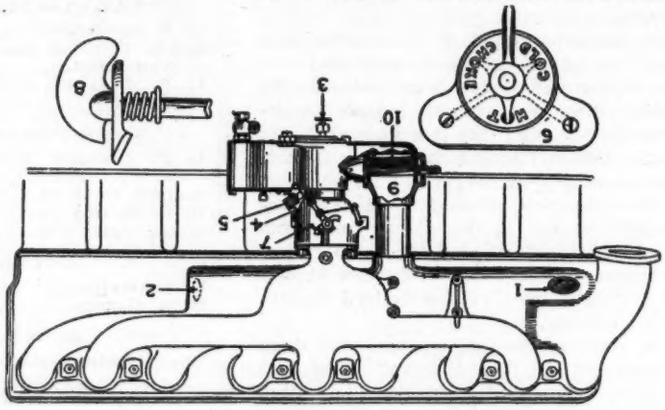


Fig. 4 — Marvel carbureter on Buick

ing the oil about every 600 miles in order to get the best running conditions. The changing of oil is a factor that is very much abused and is neglected by most car owners. With the engines as accurately machined as they are to-day, there is still a certain amount of the fuel mixture that gets by the piston, especially when the engine is cold, runs into the crankcase and aids in destroying the lubricating properties of the oil.

STUDEBAKER LUBRICATION

Q—Publish oiling and wiring diagrams for Studebaker four, 1914 model.

2—How much mileage should be obtained on a gallon of gasoline on this car? Am using a Scheber carbureter.

3—How are brakes equalized? Do rear wheels receive lubrication entirely from differential housing? Vivian M. Duddles, Chicago, Ill.

1—The oiling chart is shown in Fig. 3. The initial O before the numeral signifies oil, G signifies grease. The numeral indicates miles of travel. In addition to this chart there is also the engine lubrication to be taken into consideration, and of course the oil should be kept up to its proper level and changed frequently. The wiring diagram is shown in Fig. 6 and the ignition wiring diagram is shown in Fig. 5.

2—If this carbureter is an old carbureter that came with the car originally we do not believe that it is handling present fuel as efficiently as the newer model carbureter. With proper adjustment this car should give you from 15 to 18 miles per gallon.

3—The service brake is operated by a pedal from which a long rod passes back to a transverse bar or equalizer, crossing the chassis directly beneath the tunnel. This equalizer bar is equipped with individual rods outside the frame and just back of the forward attachment of the rear spring at either side of the car. Equalized braking action can be obtained by the proper adjustment of these rods and also the adjusting nuts on the brake bands.

4—With the exception of the grease that is introduced at the hub cap the system receives its lubrication from the differential housing.

OILING SYSTEMS COMPARED

Q—Which oiling system is the best, force, force and splash or circulating splash, constant level?—Homer Strosnider, Clarksburg, W. Va.

At the present time the combination force feed and splash system is in the lead and the circulating splash in the minority. The full force feed system is increasing in favor and it is only a question of time until it will be the dominating means of lubrication. Under some conditions the combination system works very satisfactorily but the engine cannot be run under as adverse conditions with the combination system as it can with full force feed. As a general rule an engine using the splash system is overlubricated. Many companies are experimenting to develop the most efficient lubrication system and the trend seems to be toward force feed. A certain engine company is using a force feed system and the bearing are actually floated in oil under pressure.

LUBRICATING OIL IN GASOLINE

Q—What are the good or bad effects of putting lubricating oil in the gasoline tank, say 1 qt. to one tank of gasoline? Is it good for an old engine? Some claim that an old engine will run smoother and that a new one will limber up better.—W. J. Harmon, New Hartford, Ia.

In driving new cars through from factories many drivers put about one quart of thin lubricating oil in the gasoline. This aids in preventing the piston from freezing if the car is driven hard but of course it makes the fuel situation very bad and causes considerable carbon deposit. When an engine is new it is naturally stiff and the only proper way to break it in is to drive at a very reasonable rate of speed for at least the first thousand miles. Some of the racing drivers have broken in their racing engines quickly by using about one-half a gallon of brass polish in the lubricating oil, running the engine for a short time, draining the oil, cleaning out the crankcase and refilling with new oil. This method however is hardly advisable for the average car owner. As far as the old engine is concerned the addition of old oil is only a detriment and will make the engine run worse rather than better.

COMPRESSION KNOCK

Q—In a recent article you mentioned a compression knock. Is this similar to any other engine knock?—Clemens T. Eger, Denver, Colo.

The compression knock is a very sharp pound very similar to the advanced spark and carbon knocks.

OIL COMPARISON TABLE

Q—Publish a table comparing ordinary high grade automobile cylinder oil with castor oil as to flash and fire test, viscosity, gravity, etc.—Harry Carlson, Marquette, Neb.

The samples A, B and C were purchased from ordinary sources and analyzed. They were found to be free from any traces of castor oil. The table gives a comparison between certain grades of mineral oil used for automobile lubricating purposes and cold drawn castor oil. Other properties are also given in this table.

OIL COMPARISON TABLE

	A	B	C	Cold drawn castor oil
Viscosity at 70°F	1,080	1,530	2,340	3,810
Ditto at 140°F	129	147	198	370
Ditto at 200°F	55	55	64	88
Flash point, open	405°F.	371°F.*	475°F.	480°F.
Ditto, closed	396°F.	364°F.	460°F.	450°F.
Saponifiable matter	0.24%	0.27%	0.28%	99.74%
Unsaponifiable matter	99.76%	99.73%	99.72%	0.26%
Iodine values	17	11.4	20.4	83

The Electric System

CURRENT INDICATORS

Q—Explain the difference between an ammeter and a current indicator.

2—Was an ammeter ever put on a Dodge car as factory equipment? If so, When?

3—Is it a common practice to draw current through an ammeter, when using the starting motor?—F. T. Caulkins, Rockford, Ill.

1—The difference between the current indicator and the ammeter is that the current indicator simply indicates when the generator is charging, while the ammeter shows the number of amperes of charge and discharge.

2—So far as we know the Dodge car has never been provided with an ammeter as standard factory equipment.

3—No.

MAGNETO TROUBLE

Q—Could an Overland 83-B or 85 Four engine be used in an Empire car, Model 45, without much expense in changing Empire?

2—Was the Overland model 83-B engine and model 84 Four engine the same?

3—I have an Overland model 69 engine equipped with a Remy low tension magneto and coil. It doesn't seem to give current enough at low speed and cranking. Would a Simms S-U-4 magneto be better?—Leslie Milliken, Saco, Me.

1—The Overland engine could be used in the Empire car but it would require a few changes and would be rather expensive.

2—We do not know whether the engines are identical or not, as we have no blue prints in our files that we can use for a comparison. The N. A. C. S. horse power rating of these two engines is the same.

3—If the magneto does not work correctly at low speeds and you find that the engine is missing when the spark is retarded, the trouble is probably in the contact breaker. Move the contact screw out a few notches if the engine misses at low speeds and if missing occurs at high speeds adjust the contact screw in a few notches. Be sure that the points are clean and free from grease. Remove the spark plugs and adjust the points so that there is not over 1-64 in. between them. If you desire to make a change and install another ignition system you will have to make your own selection, as we are in no position to give any recommendations.

WIRING TROUBLE

Q—Had occasion to remove the right side headlight to put in a new lamp bracket on a 1916 Overland Model 83A. In reassembling the headlight the main feed wire from that lamp to the ground was accidentally touched. There was a flash, and ever since have been unable to get a light in that lamp. The left side headlight will light, but when the dimmer button is pulled out instead of it becoming dim it goes out altogether. Have installed new fuses, looked at the switch and went over every inch of the main feed wire to that lamp looking for a break. What is the trouble?—T. J. Raphell, Philedalphia, Pa.

This is rather difficult to answer. The first thing to do is to remove the main feed wire and connect a new one in its place. If this does not remedy the trouble make an examination of the socket to see if the heavy current has not shorted it. We are inclined to believe that the main feed wire is the cause of the difficulty and that it may be broken in many places due to the very heavy current resulting from the dead ground.

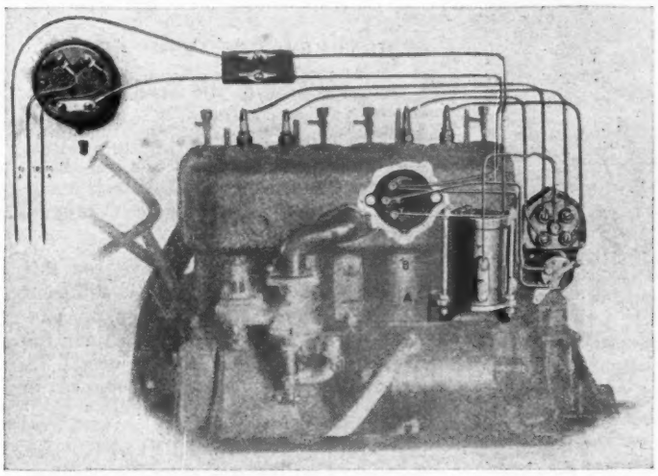


Fig. 5—Remy ignition on a 1914 Studebaker 4

Fig. 6 — Wagner starting and lighting system on a 1915 Studebaker 4

RECHARGING FORD MAGNETO

Q—In charging a Ford magneto is the positive or negative terminal of the storage battery grounded? Is it necessary to charge it on each quarter turn of the flywheel?

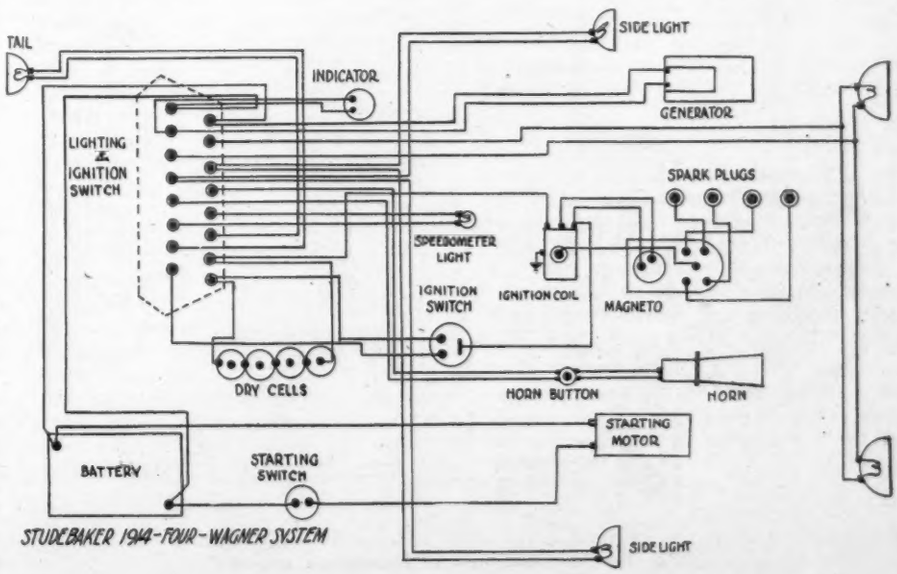
2—Why do the points stick in new relay cutout. Is the charging rate too high?

3—What is the cause of stripping the tit on the starting motor bendix set screw?—L. P. Lennard, Kirk-McKern Motor Co., Albany, Ore.

1—If you intend to use storage batteries you will have to connect several in series in order to get 30 volts or over. The positive terminal is connected to the magneto terminal on the engine. To prepare the magneto for recharging, first disconnect the wire that runs from the magneto terminal on the transmission cover to the coil on the dash. Next remove the transmission cover so you can look at the magneto. Locate the brass studs on the rim of the flywheel which holds the magnets in place and have someone turn over the engine very slowly until one of these brass studs is in line with an imaginary line drawn about 1 in. from the magneto terminal, to the left of the latter and paralleling the frame. Permanent connection of the negative terminal of the battery should not be made, but only thirty or so momentary contacts, which it is said, will recharge the magnets much more satisfactorily than if permanent contact is made.

2—The cause for new relay points sticking is probably that the contact area is small, due to poor surfacing. Even if the charging rate is not excessive, should the point of contact be very small the current that flows will cause considerable heat and will cause the points to stick.

3—If these clamping bolts get loose, the pinion will go into mesh with a bang. The result is that, the spring being loose also, the entire torque is thrown on the set screws suddenly and they shear off. When these set screws or clamping bolts are set up tight be sure that the starting motor is properly lined up. By turning the threaded sleeve with the fingers, the pinion can be moved into mesh and unless it meshes easily it is not in line.



The Power Plant

VALVE TAPPET CLEARANCE

Q—In grinding the valve on a Ford have always spaced them by piston travel this leaves about .015 in. clearance between the valve stems and the pushrod and of course leaves a tapping noise which the car owner does not like. To set the valves less than that it is said will cause the breaking of spark plug porcelain. What is your opinion on this.

2—The last engine I overhauled the oversized pistons were lapped in at a loose .003 fit and was instructed to change the pistons on the lower edge of the bottom ring groove and not to drill them so the piston will carry the oil up but the engine does not smoke or foul the plugs. Why should other engines that are not changed pump oil while this one does not? Some mechanics drill the piston when overhauling an engine to get away from this oil leak. What is your opinion on this?—L. P. Lennard, Kirk-McKern Motor Co., Albany, Ore.

In a case of this kind if a spark plug with a long shank is used it is quite possible that the porcelain may be affected. However, it has been general practice to set the valves somewhat near the neighborhood of .007 and so far as we know, a setting of this kind has always proved highly satisfactory.

2—The description of refitting the pistons is hardly complete enough to enable us to give a very satisfactory answer. A piston fitting of .003 is of course quite a close fit and there is no reason why engines with a fitting of this kind should pump oil. Much has been said about oil pumping and it is dependent upon many factors. Perhaps clearance is the first factor and the regulation of the amount of oil pumped in the lubricating system the next. In some cases certain types of pistons have been found to pump oil excessively, due to wear. If the piston is properly designed and is correctly fitted to the cylinder there is no reason why oil pumping should occur or why a hole should be drilled in the piston. It has been found necessary to drill holes in certain pistons to get away from oil pumping. On some racing engines they cut grooves in the pistons about one inch apart all the way up the piston about $\frac{1}{16}$ in. in width and 1/64 in. in depth and then drill holes in these grooves at certain intervals.

MISSING AT LOW SPEEDS

Q—A 6-cylinder 1917 Studebaker roadster series 18 with a bore and stroke of 3⅞ by 5 in. has never hit on each cylinder. When the car is running on high gear, say at 20 m.p.h., it will run and hit on all six cylinders on the level ground, but as soon as I negotiate a grade and get down to say 8 or 10 m.p.h. it will start to miss and jump. It does the same thing when the engine is running idle. The block has been bored out and new pistons installed; valves are in good shape and do not leak. The compression is 70 lb. or all cylinders. Battery is in good shape, also spark plugs, and all wires leading to spark plugs. New breaker points are set with a feller gage and seem to be all O. K. Have a good spark at every cylinder.—M. D. Worley, Newark, Ohio.

This is very apt to be vacuum tank trouble. If the float, which should be air tight, has a leak, it will fill up was gasoline and be too heavy to rise and close the vacuum valve. This means that raw gasoline will be drawn into the manifold and the engine will choke up. The flapper valve may be out of commission, manifold connections may be loose, allowing air to be drawn into the manifold, or the gasoline strainer or tubing clogged up. Oftentimes a small particle of dirt getting under the flapper valve will prevent it from seating and thus render the tank inoperative, but in many cases this trouble may be remedied by merely tapping the tank.

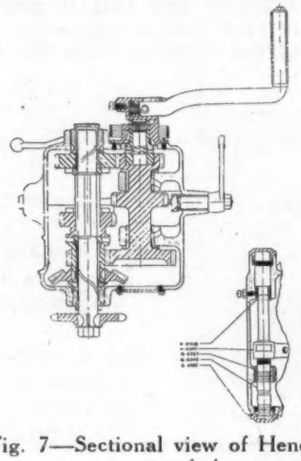


Fig. 7—Sectional view of Henderson transmission

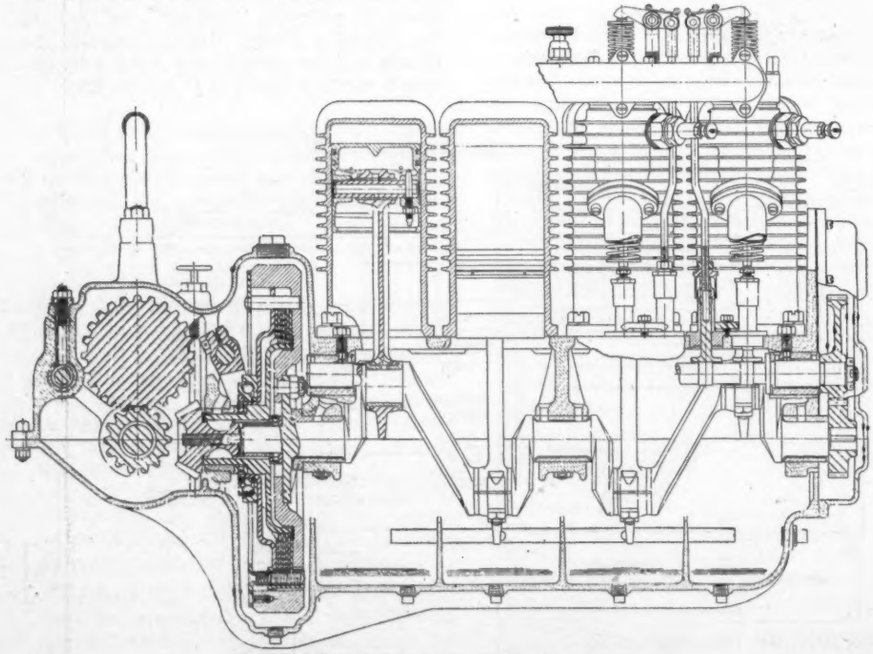


Fig. 8—Sectional view of Henderson engine

HENDERSON ENGINE

Q—Publish diagram showing sectional view of a 4-cylinder Henderson motorcycle engine.

2—What are the cylinder dimensions of this engine?

3—What is the horsepower?

4—Which is the better considering the economy, efficiency, minimum mechanical trouble, speed and endurance of engine—the 4-cylinder Henderson motorcycle or a 2-cylinder V-type motorcycle?—Andrew F. Davis, Beaverton, Mich.

1—A sectional view of the Henderson motorcycle is shown in Fig. 8.

2—The bore and stroke is $2\frac{11}{16}$ by $3\frac{1}{2}$ in.

3—The exact power developed by this engine we do not know, but it is over 20 hp.

4—This is a question we cannot answer.

HENDERSON TRANSMISSION

Q—Publish the name and address of the manufacturer of the Henderson motorcycle.

2—Explain the three speed sliding transmission that is used on this motorcycle.—Andrew F. Davis, Beaverton, Mich.

1—The Henderson motorcycle is made by the Excelsior Motorcycle Company, Chicago.

2—The transmission employed on this motorcycle is not essentially different from the transmission as used on passenger cars. In principle it is just the same, and operation is also identical. A view of the transmission is shown in Fig. 7.

EXPLOSION IN MUFFLER

Q—What causes an explosion in the exhaust pipe of a Dodge car? The valves have been reground, new piston rings and a new Stromberg carbureter installed. The timing seems alright on the magneto. The engine misses and won't run unless throttle is all the way up. It doesn't seem to hold the gas unless the engine is running at full speed and will not pull at all. When idling the engine seems to run smoothly.—Motor Sales Co., Hoberg, Mo.

This may be a result of faulty ignition or poor carburetion. The explosion in the exhaust pipe is a result of the missing for when the engine misses an explosive charge is pumped into the exhaust pipe or muffler and when the exhaust changes the heat causes the ignition of the charge. Make a careful adjustment of the carbureter and go over the ignition system very carefully. See that the breaker points are set properly. Often times, the engine will idle well because the speed is slow that the contact is long enough to allow the coil to build up but at high speeds the contact is very short. It would also be advisable to

test out the coil as a defective coil is very apt to cause this trouble.

Clutches

BUICK CLUTCH

Q—Instruct how to remove the clutch from a 1914 Buick speedster. Give adjustments.

2—Is it an oil or dry clutch?—E. Schmall, Chicago.

1—The first thing to do is to disconnect the clutch pedal shaft. Next remove the clutch collar. Disconnect the joint between the clutch and transmission. This will give access to the nut which holds the clutch spring. Remove this nut, being careful not to let the spring come back suddenly. After its removal the entire clutch can easily be taken apart. The only adjustment provided for is the pedal adjustment. The position of the clutch pedal may be adjusted by removing the cotter, slipping out the pin, and tightening or loosening the yoke on the first link between the clutch pedal and the bell crank on the transmission gear case. See that the lock nut is set back before completing the job.

2—The clutch used in this model is a cone clutch. If, through abuse or neglect, the leather facing becomes dry, a few drops of neats foot oil applied at frequent intervals will soon soften it up and make it hold better. If oil or grease gets on the clutch facing and causes it to slip, apply a little Fullers earth ground very fine. Never drive with the foot riding the clutch pedal as the rough spots in the road will make your foot move up and down and consequently the clutch will be slipping most of the time. The leather will soon glaze over and cause slipping and may possibly burn enough so it will be necessary to put in a new facing. A diagram of the clutch is shown in Fig. 10.

EMPIRE CLUTCH ADJUSTMENT

Q—Instruct how to tighten the clutch on a 1916 Empire 33.—Main Garage, Woodhull, Ill.

If the clutch is slipping it may be due to lack of tension in the clutch springs or because the clutch pedal linkage needs adjustment. This clutch has disks running in oil and after considerable running it may develop a tendency to slip. Before altering the adjustment of a clutch of this type, the oil should be drawn out and a pint or more of kerosene injected, preferably with a squirt gun. Close the opening and start the engine with the gear shift lever in neutral position and operate the clutch pedal so that the kerosene will be thoroughly distributed and the internal mechanism of the clutch well rinsed and cleared of the old and sticky oil. Drain the solution and refill the clutch with clean oil. If, after this treatment, the clutch continues to slip, draw out a little of the oil and replace the amount taken out with kerosene. The thinning of the oil in this manner gives a better contact between the plates and slipping is reduced. Unless the exact proportion of oil and kerosene is known the mixture may have to be thinned down gradually by this process. If after this test the clutch slips, the spring tension can be adjusted by turning the adjusting nuts on the back of the clutch. Great care should be taken to see that all of the adjusting nuts are turned up the same amount. Be sure that the clutch pedal does not come back against the foot board when the clutch is engaged. There should be at least 3-8 in. clearance. See that you have at least ¼ in. clearance between the clutch disk hub and clutch sleeve when the clutch is fully engaged. Do not make too great an adjustment so as to shorten the travel of the clutch sleeve, as to short a travel on your clutch pedal will not let the clamping lever come back far enough so that the outer end will engage against the master ring. This would not pull the master ring free from the friction disk and would cause the clutch to drag. In case the clutch drags, be sure that the master ring pulls back at least $\frac{1}{16}$ in. when the clutch is fully released.

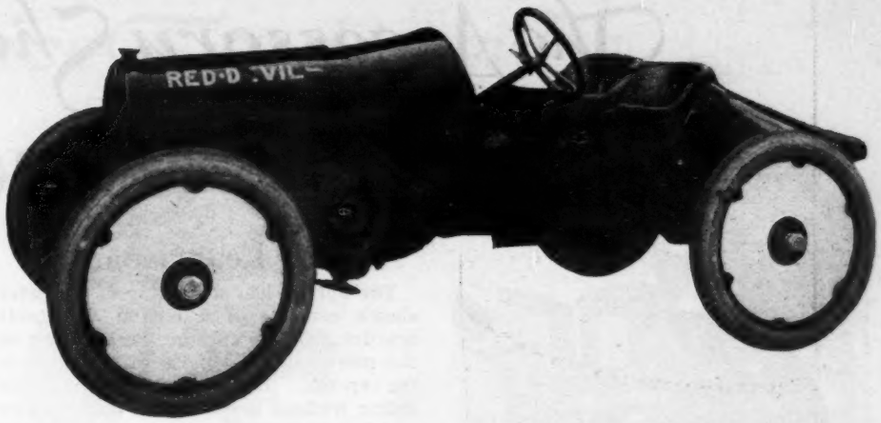


Fig. 9—Photograph of a rebuilt Dodge made especially for racing purposes. This car was made by Herbert McClellan, St. Joseph, Mo.

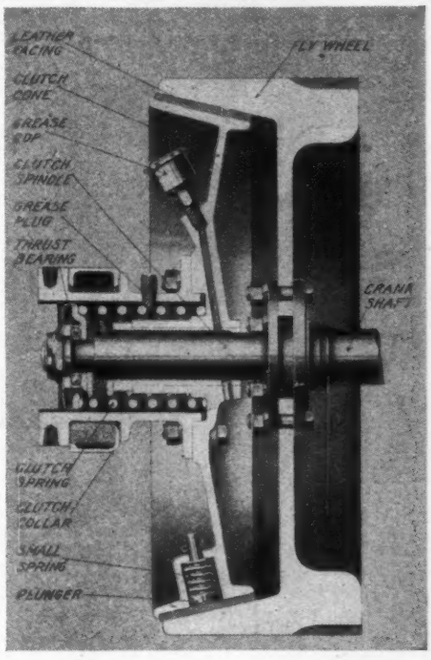


Fig. 10—Clutch on the 1914 Buick

Rebuilding

REBUILT DODGE

Q—Advise the best way to make a regular Dodge engine into a racing car? We prefer using this car on a small track and want to put it out as a regular Dodge stock car.—The Massillon Garage Co., Massillon, O.

Fig. 9 shows the picture of a Dodge car that was rebuilt for racing purposes and it is claimed attained a speed of over 75 m.p.h. on a dirt track. About the only changes that were made in this engine were increasing the size of the valves, and in this case they used Hudson Super-Six valves. If the car is to be used for racing purposes it might be well to lighten the pistons and connecting rods, increase the size of the valves, advance the valve timing and provide a high speed camshaft which will give increased valve lift.

REBUILDING A FORD

Q—I am considering building a car after the following manner for a cross-country trip:

By using Ford rear axle assembly, a Ford front axle, 30x3½ Ford wheels and 31x4 tires all around, a frame with semi-elliptic springs from 120 to 130 in. wheel base, a worm steering gear and a light six cylinder engine of the unit power plant type or possibly an 8-cylinder engine. The body will be a light one-seated affair with room for small amount of luggage. Would this arrangement be practical? If not give reasons why it would be unsatisfactory. Should the Ford differential gear ratio be used?

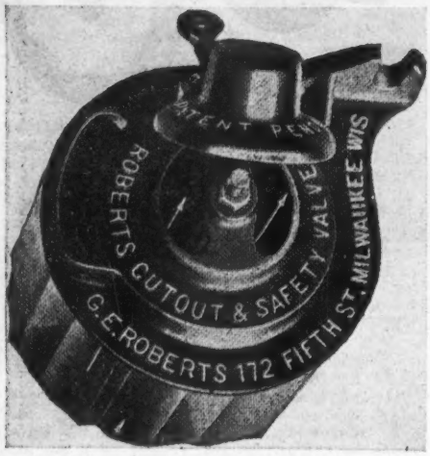
2—Publish the name of one power plant that you think would be suitable?—E. A. Bradley, Winesap, Wash.

1—If you intend to build a car of this type it merely means rebuilding a Ford to meet your requirements. The only advisable thing to do is to install a 16-valve head and leave the rest of the car as it is. If you attempt to build the car by changing the entire construction, it will mean enough of an expense so that you might better buy a higher priced car in the first place.

2—We are in no position to recommend any engine and you will therefore have to let judgment be your deciding factor in the selection of an engine to be used in this chassis.

The Accessory Show Case

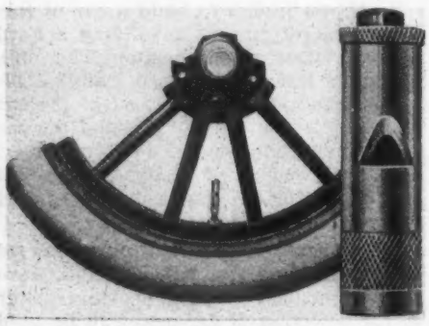
New Fitments for the Car



Roberts cutout and safety valve

Automatic Under-Inflation Signal

If a tire is not properly inflated there are certain items of damage which will always occur. The outer casings will become rim cut; the constant flexing when the tire is under-inflated cracks and injures the fabric of the casing itself. There is also a certain amount of heat generated as a result of the flexing and this aids greatly in destroying the strength of the fabric. The question is, does the driver of a car pay any particular attention to the amount of tire inflation? If the tires lose some of their pressure, does the driver have them pumped up immediately or does he let them go until they show signs of being almost flat? The accessory shown is a product of the Ewing-Ely Mfg. Co., 3034 S. Main St., Los Angeles, Cal. It is attached directly to the tire valve in place of the dust cap as shown. This accessory does not interfere with pumping up the tires, but in case the pressure drops below a specified amount there will be a whistle. The price is $4 per set of four whistles.



Automatic under-inflation tire signal

Spring Leaf Separator

The spring leaf separator or spreader shown consists of a sliding adjustable arm for any size spring. Perhaps one of the most neglected parts of a chassis is the spring. In order to insure good riding without noise and to prevent rust which may result in a broken spring, the leaves should be properly lubricated. This device is handy, not only for the car owner, but for the service man as well. It was patented April 27, 1920, by F. W. Volz, 3914 Grant Road, Washington, D. C.

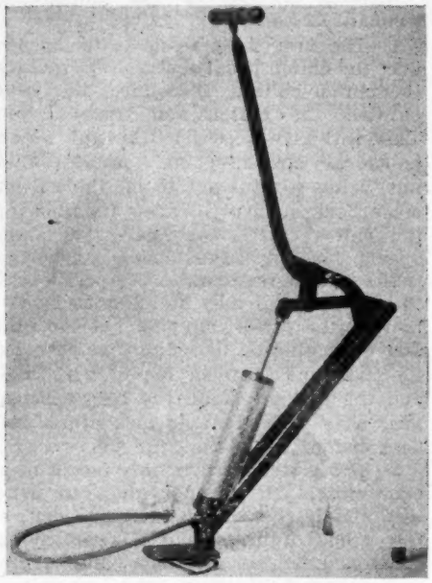
Spring leaf separator

J. K. Lever Pump

A hand tire pump which will inflate a tire quickly to a pressure of 80 or 90 lbs. is now being placed on the market by the Mor Air Auto Pump Co., Naperville, Ill. This lever pump is capable of forcing air against a pressure of over 250 lbs., is of all pressed steel construction and has no stuffing box. A steel plunger and heavy cup leather are the only parts of the large compression cylinder. It is claimed that a large tire can be inflated with one-third the strokes required by an ordinary cylinder pump. The pump will fold up and fit in any tool box.

Roberts Cutout and Safety Valve

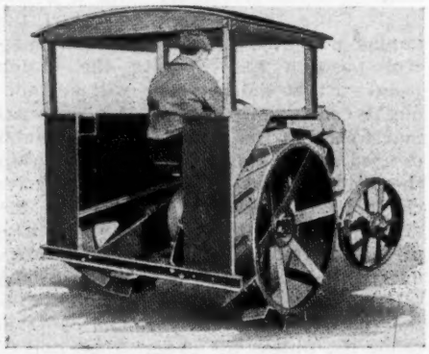
The Roberts cutout and safety valve is built to replace the regular exhaust end on the Ford muffler. It is equipped with a spring controlled valve and any troubles that might cause an explosion in the muffler and destroy it will force open the safety valve and allow the exhaust gases to pass out of the muffler without any damage. A hand control permits the opening of the safety valve and acts as a regular cutout. It is of simple construction and easily installed. This device is manufactured by G. D. Roberts, 172 Fifth St., Milwaukee, Wis., and lists at $4.



J. K. lever pump

Bull Dog Balance Hitch Fender and Cab

The balance hitch fenders and cab shown herewith are accessories that are well worth installing on the Fordson tractor. The fenders are of simple, sturdy construction and are easily attached. The balance hitch is a rigid support for this fender and it is claimed will also lessen vibration. The cab is very desirable for the protection of the driver. These products are manufactured by the W. H. Thomas Mfg. Co., Spencer, Iowa. The balance hitch selling at $25; the fenders and balance hitch combined $45.



Bull Dog balance fender hitch

Service Equipment
Time Savers for the Shop

Sioux Valve Tool Set

The Sioux valve tool set illustrated here is complete enough to take care of practically all of the jobs that an average service station is likely to get. The standard set is made in 45 deg. angle only and the price is $28.50. This set is manufactured by the Albertson & Co., Sioux City, Iowa.

Sioux valve tool set

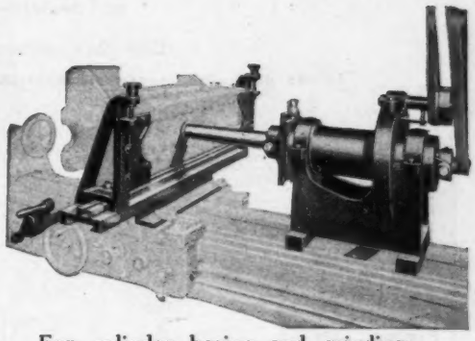
Tube Couplings Cabinet

To meet the steadily increasing demand for S. A. E. flared tube couplings and to facilitate the handling of these fittings the Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, has placed on the market the stock cabinet shown in the illustration, for the use of service stations. The cabinet is finished in golden oak and each drawer has an illustrated label showing contents and sizes.

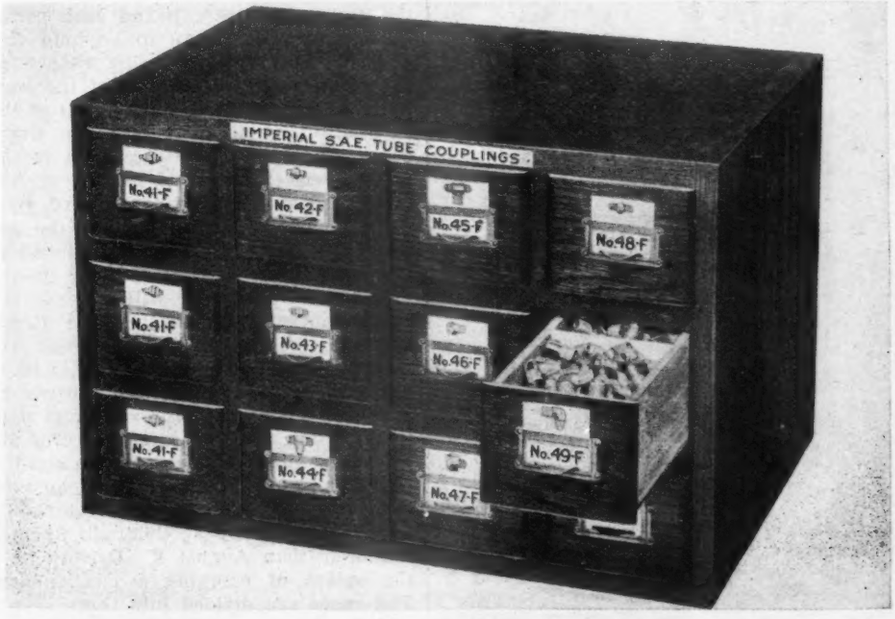
Neihoff mag-charger for recharging Ford magnets

Fox Cylinder Boring and Grinding Machine

The Fox cylinder boring and grinding machine, shown herewith, is designed for service station work and has the following claims made for it: It bores or grinds equally well; it can be used on either closed or open head cylinder blocks; it fits any lathe, 14 to 24 in. swing; the use of the Fox does not interfere with chucking work in the lathe and it costs only $385, which puts it within reach of a great many service stations doing this class of work. This machine attaches to the tail end of the lathe bed and does not interfere with the use of the lathe on most turning and boring jobs. It is easily mounted or removed, as the case may be. The table and brackets for the support and position of the block are fastened on the carriage of the lathe by four clamp bolts. The work can be changed from one cylinder bore to another in a very few seconds. The machine is the product of the Sunderland Machinery & Supply Co., Omaha, Nebr.



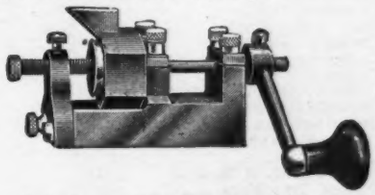
Fox cylinder boring and grinding machine



Cabinet for conveniently handling S. A. E. flared tube couplings

Neihoff Mag-Charger

The Niehoff Mag-Charger was designed for recharging Ford magnets, burning out shorts in the Ford magneto case and in addition it is a complete electrical testing outfit. The illustration shows the attachment for testing Ford coil units, electric bulbs and spark plugs. This equipment will enable the Ford service station to give quick electrical service with a definite determination, which will appeal to the motorist. It can be operated by any ordinary mechanic with success. The entire equipment, including cables with terminals, is listed at $60 by Paul G. Niehoff & Co., 232-242 E. Ohio St., Chicago.



Valve Refacing Tool

The Sioux valve refacing tool is especially designed for refacing work. No centering necessary and it handles any valve up to 2½ in. in diameter. Cutters for 30, 45 or 60 deg. valve heads can be slipped into the tool by simply removing one screw. It is a product of Albertson & Co., Sioux City, Iowa, and sells for $7.25 fitted.

TUBING AND HOSE SIZES

For 1919 and 1920 Cars

Motor Age Maintenance Data Sheet No. 104

One of a series of weekly pages of information valuable to service men and dealers—save this page

1919 *cars continued from last week*

Inside diameter measurements given except where otherwise indicated

Car and Model	Gasoline Tubing Diam.	Oil Tube Diam.	Hose Diam. and Length (Upper)	Hose Diam. and Length (Lower)
Paige, 6-55	5/16	5/16	1¾ & 9½	1¾x12
Pan American, 6-48	5/16	¼	1½x—	1¼x—
Paterson, 6-47	¼	¼	1¼x10	1¼x14½
Peerless, 56	5/16	5/16	2-1 13/32x7	1-1 21/32x5½
Phianna	.....	.....	.....	.....
Piedemont	.....	.....	.....	.....
Pierce-Arrow	5/16	.....	.....	.....
Pilot, 6-45	¼	¼ & 5/16	1½x10	1x6
Premier, 6-C	5/16 OD	5/16 OD	1½x5½	1¼x8¾
Reo, T & F	.180	.180	1x5½	1x5½
ReVere, C	⅜	5/16	1½x9	1½x4
Roamer, all	5/16	5/16	1½x13	1¼x10
R. & V. Knight, L	5/16	5/16-¼ & 3/16	2¼x6	2 x6⅛
Sayers, B. P	3/16	3/16	1¼x12	1¼x12
Scripps-Booth, 6-39	.180	.180	1¼x15	1x7½
Seneca, H	.180	.2425	2x13½	2x13½
Singer	.....	.....	.....	.....
Spacke	.....	.....	.....	.....
Standard	¼	¼	1¼x6	1¾x4
Stanley, all	5/16	3/16	.....	.....
Stearns	.....	.....	.....	.....
Stephens, 70	5/16	3/16	3/16x6¾	3/16x6½
Studebaker, all	¼	3/16	1⅞x10½	1⅞x8¾
Stutz, G	⅜	None	2x8	1¼x15
Templar, 445	5/16	5/16	1¼x7¾	1½x9¾
Texan	5/16 OD	¼ OD	2¼x8½	2¼x15
Tulsa	5/16	None	2⅜x—	2⅜x—
Velie, 48	¼	3/16	1¼x10½	1¼x9
Westcott, A-38	3/16	3/16	1¼x { 2½ / 7¼	1¼x { 2½ / 13½ / 10½
Westcott, B-38	3/16	3/16	1¼x4	1¼x1¼
Westcott, A & B-48	¼	¼	1½x9	1¼x { 2⅜ / 1⅞
Willys-Knight, 20	.....	.....	.....	.....
Winton, 24	¼	¼	1½x5¼	1½x24

TUBING AND HOSE SIZES FOR 1920 CARS

Inside diameter measurements given except where otherwise indicated

Car and Model	Gasoline Tubing Diam.	Oil Tube Diam.	Hose Diam. and Length (Upper)	Hose Diam. and Length (Lower)
Allen, 43	¼	⅜	2½x6	2x2½
American	.....	.....	.....	.....
Anderson	¼	.311	1½x10	1¼x9½
Apperson, 8-20	5/16	½	3x12	2x9
Argonne	.....	.....	.....	.....
Auburn, 6-39-H	5/16	¼	1¼x2	1¼x12½
Beggs, 20-T	¼	⅛	1¼x6½	1¼x11¾
Biddle, B-1, B-5	¼	.....	2⅛x4½	1⅝x5
Bour-Davis, 21	5/16	¼	1½x9¾	1¼x8½
Brewster	.....	.....	.....	.....
Briscoe, 4-34	¼	¼	2x—	2x—
Buick, H-45, K-45	5/16	.....	.....	.....
Cadillac	.....	.....	.....	.....
Case, V-20	5/16	5/16	1½x9	1¼x6¾
Chalmers, 6-30	19/64	⅛	2½x5¼	{ Short—2¼x3 / Long 2¼x4¼
Champion	¼	¼	2¼x10	2¼x14
Chandler	5/16 OD	¼ OD	1⅝x11⅜	1⅝x9⅞
Cleveland, 40	5/16 OD	⅜-¼-⅛	1¼x3½	1¼x6½
Climber, T-4-40	¼	.....	2x11	2x14
Cole Aero Eight, all	¼	¼	1½x21¾	1¼x3¾
Columbia, all	.032*	.....	1¼x2¼	1¼x13
Comet	.....	.....	.....	.....
Commonwealth, 42	3/16	None	2¼x12½	2¼x14½
Crow-Elkhart, L-55	¼	.....	2¼x12½	2¼x19
Crow-Elkhart, H-55	¼	.....	1½x12	1x7
Cunningham, V-4	.....	.....	.....	.....
Daniels, D-19	¼	3/16	1¾x3¾	1¾x8⅝
Davis, all	5/16 OD	¼ O D	1¼x11	1¼x12½
Dixie Flyer, H, Ser. 10	.2375	.2375	2x17	2x17
Dodge Brothers	¼	⅝	1 3/16x7¼	1½x7
Dorris, 6-80	5/16 OD	.....	.....	.....
Dort, 10-15	.24	.18	2¼x6	2¼x15⅛
Economy	.....	.....	.....	.....
Elcar	.....	.....	.....	.....
Elcar	.....	.....	.....	.....
Elgin, Series H	5/16	¼	1⅞x7½	1⅞x15⅝
Essex, A	5/16	5/16	2½x4	2¼x14
Ferris, C-20	¼	⅛	1½x13	1¼x11
Ford	3/16	5/16	1¾x2¾	1¾x2¾
Franklin, Series 9	.18	.18	.....	.....
Gardner	¼	None	2¼x9½	2¼x15½
Geronimo	5/16 OD	.....	.....	.....
Grant, HX	.256	.193	2¼x8	1 13/16x3¾

1920 *cars to be continued next week*

SOME ANGLES OF THE FUEL QUESTION

(*Concluded from page 9*)

not a prohibiting factor. But, to supply the existing cars and trucks with alcohol fuel, 4,000,000 sq. miles of territory would be needed to raise sufficient sugar beets to produce the fuel. And sugar beet is one crop most prolific in alcoholic content. This puts to rest the theory that corn husks could be utilized to produce fuel in sufficient quantities to supply all demand. When sugar beets, which are higher in alcoholic content than practically any other form of vegetable matter, would require 4,000,000 sq. miles of territory to supply the demand, how can the mere refuse from a less prolific source, from much less than one-tenth of that area, supply the demand?

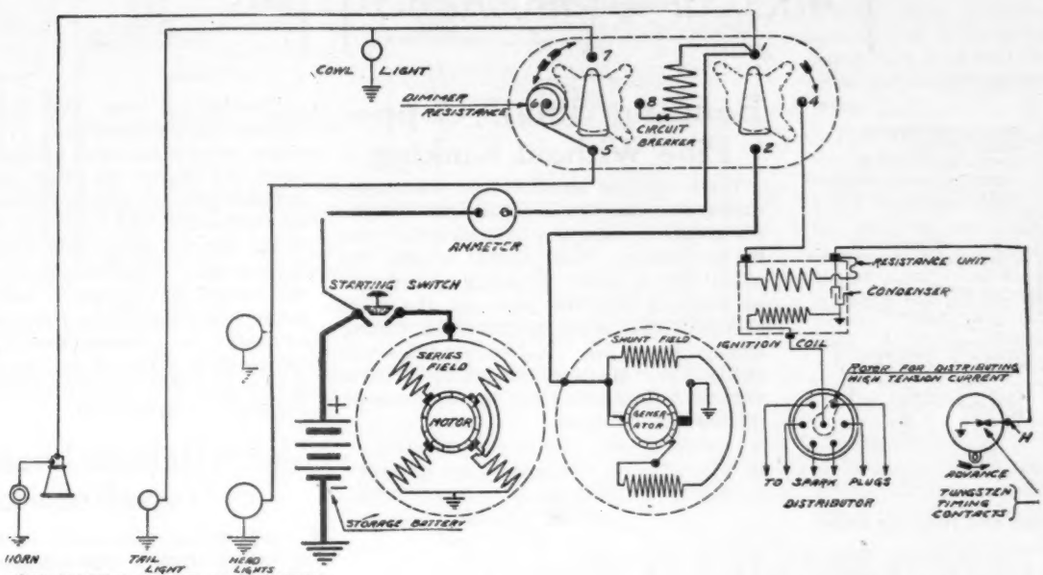
Shale it is argued contains enough oil and gasoline to supply all needs. This is true, and shale rock deposits are existent in practically indeterminable quantities. Before this large quantity of gasoline can become available, means must be developed for its extraction. It would seem inexpedient to consume one national resource to convert another into a usable product; yet this is exactly what has been advocated. Shale is a natural oil bearing stone or gravel. Before this oil can be extracted, the stone must be crushed and then roasted. At least this method is the one most commonly proposed. However, with some experimentation, means will no doubt be devised which will allow of conversion without the vast consumption of coal. Until an efficient means has been devised for the extraction of this gasoline in the shale, we will use gasoline. And there is no possibility that this supply can be exhausted for a few generations to come, at least.

RESUME PIKE'S PEAK RACE

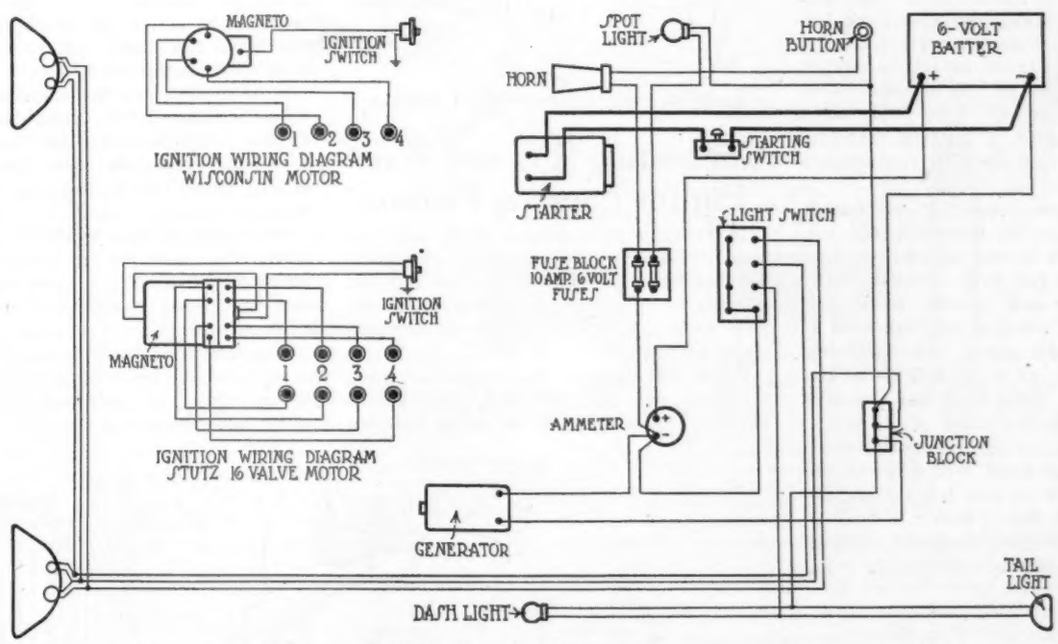
Colorado Springs, Colo., July 6.—Automobile men all over the United States will be interested in the announcement that the Pike's Peak automobile races for the $5,000 Penrose cup and cash prizes aggregating $3,000 are to be held this year on Sept. 6 after being suspended for three years on account of the war. In 1916 these races to the summit of the highest automobile highway in the world created nation-wide interest and in the events were entered such famous drivers and speed kings as Ralph Mulford, Barney Oldfield and Hughie Hughes, the last mentioned having been killed soon afterwards at Uniontown.

The races this year will be over the same course from the Crystal Creek bridge to the summit of Pikes Peak, approximately 12 miles, 2,200 feet, with a flying start not to exceed 200 yards. The events are under the rules and with the sanction of the contest board of the American Automobile association and the entry blanks properly certified must be in the office of the Pike's Peak Automobile Highway Company at Colorado Springs not later than August 8. Drivers have the option of carrying a mechanician. The races are divided into three events and the drivers go against time.

Motor Age Weekly Wiring Chart No. 85



1917 MOON 6-43 DELCO SYSTEM



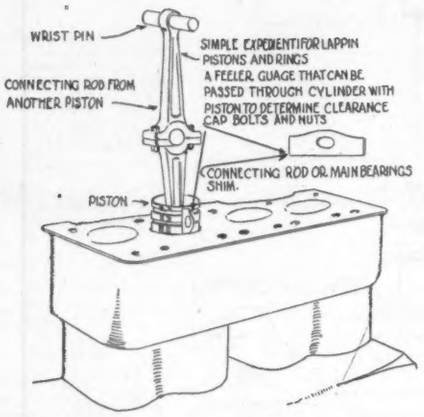
1917 STUTZ REMY ELECTRIC BOSCH IGNITION

Name of car and date on which wiring diagrams have appeared in previous issues

Allen—June 17, '20
Briscoe—May 6, '20
Chalmers—June 17, '20
Chandler—May 20, '20
Cole—June 10, '20
Dodge—July 1, '20
Elcar—May 6, '20
Franklin—June 3, '20
General Battery Charging—Sept. 15, '19
General Magneto Diagram—June 5, '19
Haynes—June 24, '20
Hupmobile—May 27, '20
Internal Connections—July 10-17-24, '19
Jeffery—May 13, '20
Jordan—June 10, '20
King—May 20, '20
Kissel—May 27, '20
Locomobile—June 6, '20
Moline-Knight—May 20, '20
Peerless—May 13, '20
Studebaker—July 1, '20
Special Systems for Fords—May 15-22, '19

The Automotive Repair Shop

Practical Maintenance Hints


WRIST PIN
SIMPLE EXPEDIENTFOR LAPPIN PISTONS AND RINGS
A FEELER GUAGE THAT CAN BE PASSED THROUGH CYLINDER WITH PISTON TO DETERMINE CLEARANCE
CAP BOLTS AND NUTS
CONNECTING ROD FROM ANOTHER PISTON
CONNECTING ROD OR MAIN BEARINGS SHIM.
PISTON

Lapping in pistons and rings by hand

Expanding Lap for Finishing Cylinders

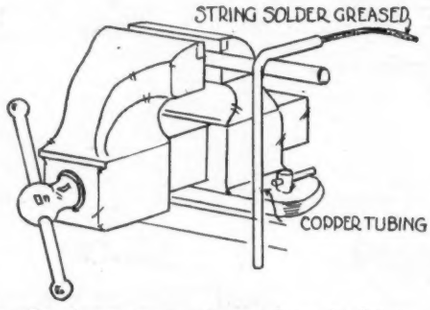
An inexpensive lap that is of advantage in finishing cylinders after reboring, or where minor scores exist as from the use of dirty oil or excess carbon, can be turned up on the lathe, of either oak or maple. The center of the lap should be bored with a tapered hole and cross slotted. Then using a tapered mandrel the lap can be expanded to compensate for wear.

An old axle, with a tapering end, makes a suitable mandrel for mounting the lap. The opposite end of the mandrel should be turned to fit the drill press spindle, as best results and speedy work can only be obtained when a lap is rotated at a reasonably high speed. In mounting the lap the flutes or slots will be at the top, in the drill press and the abrasive will feed down to the faces of the lap.

Use flour of emery and oil as the abrasive and work the hand feed lever of the drill press rapidly up and down while the lap is rotating if the cylinder is only to be polished, but if the cylinder is slightly scored the lapping should begin with coarse emery.

Bending Small Copper Pipe Without Kinking

When bending small copper tubing for carbureter and vacuum tank connections for a car, the tubing will invariably close up or kink in these abrupt bends. To avoid this a piece of string solder can be inserted into the pipe and the most abrupt bends made without the tubing closing up at all. The solder pulls out easily after bending, especially if it is greased before being put in, or it can be melted out if desired.



Bending copper pipe without kinking

Connecting Rod and Wrist Pin for Lapping Pistons

In lapping pistons and rings into engine cylinders, the simplest expedient for handling the piston in the lapping process is by means of a connecting rod and wrist pin from another of the engines pistons.

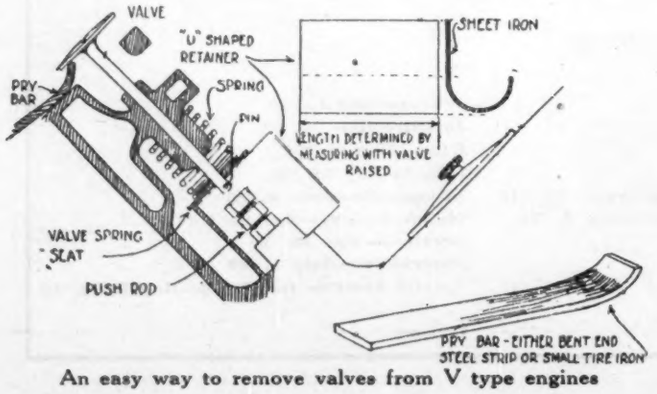
Place the ends of the connecting rods together and use the wrist pin for a handle. This involves no extra handles or equipment and will prove advantageous to the mechanic. To determine when enough material has been removed from the piston to allow for heat expansion, place a shim as is used on main or connecting rod bearings on the side of the piston. When this will go through the cylinder without effort, along with the piston the lapping is sufficient. Not many lap strokes are required and it is advisable to proceed slowly, otherwise too much is removed and oil pumping or piston slap will develop rapidly after the engine is reassembled.

Valve Removal From "V" Type Engines

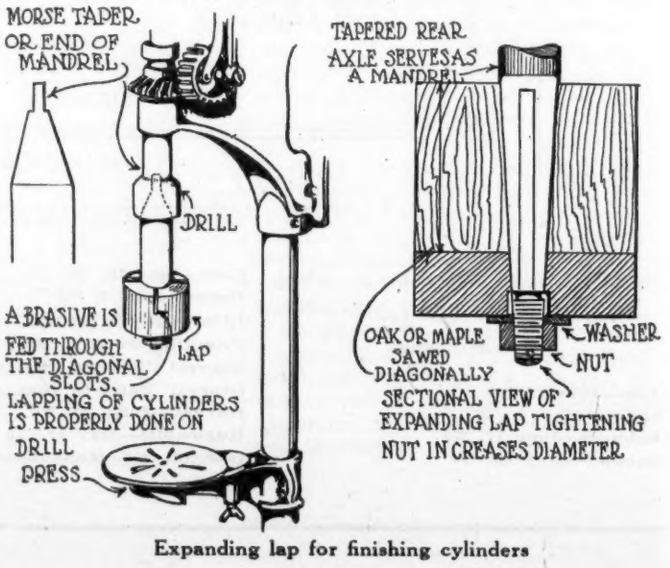
Difficulties experienced in the removal of valves from V type engines, eights or twelves, are overcome by using the method shown in the illustration. The valves are usually located between the cylinders and in an awkward place for using a regular valve lifter, also a cramped place to put in the spring seat pin with the valve lifter in place. A bent and flat strip of steel or small tire tool is used to pry the valve up after the valve is lifted by the push rod when the engine is turned over by the crank. A U shaped piece of sheet iron is then placed under the spring seat or cap and the pry bar removed.

The valve is then free and the pin can easily be removed or reinserted, the work of grinding the valve or reseating can be done without removing the springs at all.

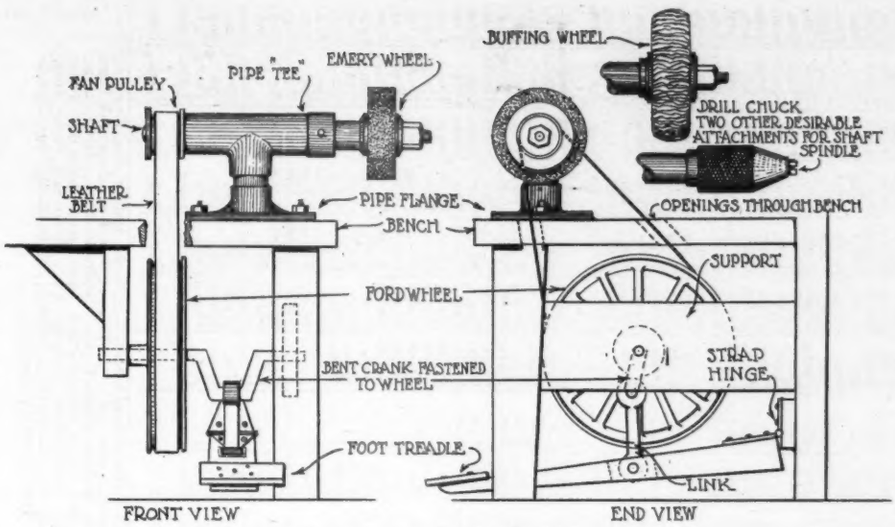
The length of these U shaped members is determined by lifting the valve with the pry bar and measuring with a pair of calipers or rule.



An easy way to remove valves from V type engines


MORSE TAPER OR END OF MANDREL
DRILL
ABRASIVE IS FED THROUGH THE DIAGONAL SLOTS.
LAP
LAPPING OF CYLINDERS IS PROPERLY DONE ON DRILL PRESS
TAPERED REAR AXLE SERVESAS A MANDREL
OAK OR MAPLE SAWED DIAGONALLY
WASHER
NUT
SECTIONAL VIEW OF EXPANDING LAP TIGHTENING NUT IN CREASES DIAMETER

Expanding lap for finishing cylinders



Repair shop emery and buffing wheel which can be rigged up from scrap material in spare time

Demountable Body and Chassis Trestle

A repair shop or garage trestle that is easily demounted and placed in position under a car body or chassis, when wheels, axles, springs, etc., are removed, consists of a three by four beam about seven feet long and two ends, made from pipe and couplings into the shape of the letter "A."

The supports being detachable from the beam make it convenient to slide the beam horizontally under the car and place the legs into position to support the body on the beam. When this trestle is not in use, it can immediately be taken apart and stowed in the corner, entirely out of the way.

Repair Shop Emery and Buffing Wheel

Many small shop repairmen content themselves with dull tools or worry along with an old-fashioned grindstone when they could, in their spare time, rig up out of scrap materials very serviceable equipment in the way of grinders that will save time and expense.

A discarded Ford front wheel, fan pulley, piece of leather belting and several other odd parts are combined in the sketch to make up such a grinder. This improvised machine is not alone useful for grinding, but can also be used for a buffing wheel and light drilling work.

A clincher type of wheel affords flanges that hold the belt in place when used with a flanged pulley. The foot treadle is made up mainly of wood, and is secured to the bench with a strap hinge. The grinding wheel support consists of a pipe "tee" and a pipe flange.

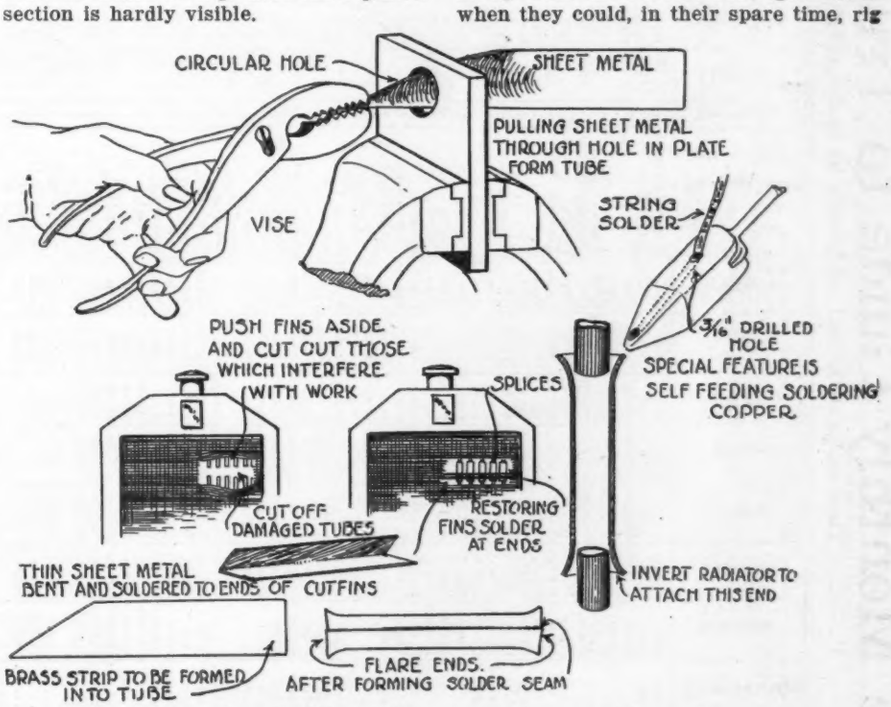
Methods of Repairing Tubular Radiators

Repairs can be made to the tubes of Ford or other tubular type of radiator, without taking the radiator apart for the insertion of new complete tubes, by splicing the ends of the damaged parts.

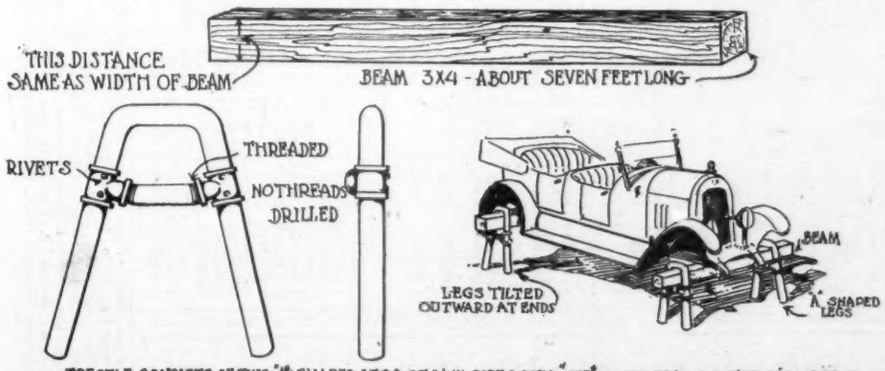
To do this it is necessary to cut out some of the fins and pry the others apart sufficient to get to the damaged section. Cut the ends of the broken tubes off with the shears, round up the ends and clean them for soldering. Draw as many pieces of sheet brass into tubes by the method as shown as are required.

These oversize tubes are simply thin sheet metal pulled through a drilled hole with a pair of pliers. The seam is soldered up. This is slipped on to overlap the ends of the cutout tube. Slight flaring of the ends of the section provides a space for the solder. To get the solder to the tube at the proper place, a drilled hole through the soldering copper is of much assistance. String solder can be fed direct to the point of the copper. The radiator should set vertical and turned over for the bottom ends of the splices.

When the tubes are repaired the intact fins should be pried back into place, those that are cut out can be restored by soldering bent strips of sheet brass across the opening. These strips are held by a bit of solder at each end, and after the radiator is painted the repaired section is hardly visible.


CIRCULAR HOLE
SHEET METAL
PULLING SHEET METAL THROUGH HOLE IN PLATE FORM TUBE
VISE
STRING SOLDER
PUSH FINS ASIDE AND CUT OUT THOSE WHICH INTERFERE WITH WORK
SPLICES
3/16" DRILLED HOLE
SPECIAL FEATURE IS SELF FEEDING SOLDERING COPPER
CUT OFF DAMAGED TUBES
RESTORING FINS SOLDER AT ENDS
THIN SHEET METAL BENT AND SOLDERED TO ENDS OF CUT FINS
INVERT RADIATOR TO ATTACH THIS END
BRASS STRIP TO BE FORMED INTO TUBE
FLARE ENDS. AFTER FORMING SOLDER SEAM

A good method for making repairs on a tubular radiator


THIS DISTANCE SAME AS WIDTH OF BEAM
BEAM 3X4 - ABOUT SEVEN FEET LONG
RIVETS
THREADED
NO THREADS DRILLED
SEAM
LEGS TILTED OUTWARD AT ENDS
A SHAPED LEGS
TRESTLE CONSISTS OF TWO "A" SHAPED LEGS OF 1¼" PIPE WITH "TEE" COUPLINGS AND THE CROSS PIECE

Demountable body and chassis trestle, which, when not in use can be taken apart and put away

Motor Age Monthly Guide to Truck Specifications

These tables are revised and brought up to date monthly

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
A & B 3T	3	.....	48x3½d	48x3½d	Own	4-5.17x4½	Bosch	none	none	Scheb	none	Own	in-g	Own	Gem
A & B 5T	5	.....	48x3½d	48x5d	Own	4-5.17x4½	Bosch	none	none	Scheb	none	Own	in-g	Own	Gem
Acason R	1	$2,400	36x3½	36x5	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Marvel	Fuller	Fuller	worm	Timkn.	Ross
Acason RB	1½	2,650	36x3½	36x6	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Marvel	Fuller	Fuller	worm	Timkn.	Ross
Acason H	2½	3,850	36x4	36x8	Wauk.	4-4½x5½	Eise.	.....	Wauk.	Marvel	Detlaff	Cotta	worm	Timkn.	Ross
Acason L	3½	4,900	36x5	40x5d	Wauk.	4-4½x6½	Eise.	.....	Wauk.	Marvel	Detlaff	Cotta	worm	Timkn.	Ross
Acason M	5	5,850	36x6	40x6d	Wauk.	4-5x6½	Eise.	.....	Wauk.	Marvel	Detlaff	Cotta	worm	Timkn.	Ross
Acason Tractor	6	.....	36x4	36x7	Wauk.	4-4½x5½	Eise.	.....	Wauk.	Scheb.	B &B.	Cotta	worm	Timkn.	Ross
Acason Tractor	10	.....	36x5	40x5d	Wauk.	4-4½x6½	Eise	.....	Wauk.	Scheb.	B &B.	Cotta	worm	Timkn.	Ross
Ace	1½	2,750	34x3½	34x5	Buda	4-4½x5½	A-K	West	Pierce	Scheb.	M.&E	Cotta	worm	Timkn.	Ross
Ace	2½	3,450	36x4	36x7	Buda	4-4½x5½	A-K	West.	Pierce	Scheb.	M.&E	Cotta	worm	Timkn.	Ross
Ace	3½	.....	36x4	36x7	Buda	.....	A-K	West.	Pierce	Scheb.	M.&E.	Cotta	worm	Timkn.	Ross
Acme B	1	2,175	34x3½	34x5	Cont.	4-3½x5	Eise.	G&D	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme F	1½	2,375	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme A	2	3,050	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme C	3½	4,050	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme E	5	5,150	36x6	40x6d	Cont	4-4½x6	Eise.	.....	Cont.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Air.O.Flex C	1½	.....	36x3½	36x5	Buda	4-3½x5½	Wag.	.....	Pharo	Strom.	B.&B.	B.Lipe	in-g.	Russel	Ross
All-American	1	1,795	33x4*	32x4	H-S	4-3½x5	Simms	none	none	Strom.	Detlaff	Cotta	in g.	Torbn.	Lavn.
All-American	1½	2,195	34x4	34x5	H-S	-3½x5	Simms	.....	.....	Strom.	Detlaff	Cotta	in g.	Torbn.	Lavn.
All-American	2½	2,395	34x4	34x6	H-S	-3½x5	Simms	.....	.....	Strom.	Detlaff	Cotta	in g.	Torbn.	Lavn.
All-Power C	3½	.....	36x6	36x10	Cont.	4-4½x5½	Eise.	West.	Mon.	Zenith	Detlaff	Cotta	worm	Timkn.	Ross
Apex C	1	1,745	33x4	32x3½	Bdua	4-3½x5½	A-L	A-L	none	Strom.	Fuller	Fuller	in g.	Torbn.	Lavn.
Apex D	1½	1,915	32x3½	32x4	Buda	4-3½x5½	A-L	A-L	none	Strom.	Fuller	Fuller	in g.	Torbn.	Lavn.
Apex E	2½	2,695	36x4	36x6	Buda	4-4½x5½	Eise.	Eise.	Duplx.	Strom.	Fuller	Fuller	in-g	Torbn	Lavn.
Armleder HW	2½	.....	36x4	36x4d	Cont.	4-4½x5½	Bosch	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Armleder KW	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Atco IG.10	1	.....	34x4½	36x6	.....	4-3½x5½	.....	West.	.....	Strom.	Fuller	Fuller	in-g.	Torbn.	Ross
Atlas	½	.....	.....	3½x5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atterbury 7CX	2½	3,375	36x4	36x4d	Cont.	4-4½x5½	Berl.	none	Mon.	Zenith	B-Lipe	B Lipe	worm	Timkn.	Gem.
Atterbury 7D	3½	4,175	36x5	40x5d	Cont.	4-4½x5½	Berl.	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Atterbury 8E	5	5,575	36x5	40x6d	Cont.	4-4½x6	Berl.	Delco	Cont.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Autocar 21UF	2	2,300	34x4	34x5	Own	2-4½x4½	Bosch	none	none	Strom.	Own	Own	d-rd.	Own	Own
Autocar UG21	2	2,400	34x4	34x5	Own	2-4½x4½	Bosch	none	none	Strom.	Own	Own	d rd.	Own	Own
Available H-1½	1½	2,550	36x3½	36x5	Herc.	4-4x5½	Bosch	Opt.	Pierce	Strom.	Detlaff	Cotta	Worm	Wis.	Ross
Available H-2½	2½	3,250	36x4	36x8	Cont.	4-4½x5½	Bosch	Opt.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timk.	Ross
Available H-3	3½	4,200	36x5	40x5d	Cont.	4-4½x5½	Bosch	Opt.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timk.	Ross
Available H-5	5	5,575	36x6	40x10	Cont.	4-4½x6	Bosch	Opt.	Cont.	Strom.	B-Lipe	B-Lipe	worm	Timk.	Ross
Available H-7	7	6,000	36x6	40x14	Wauk.	4-5x6½	Bosch	Opt.	Wauk.	Strom.	B-Lipe	B-Lipe	worm	Savage	Ross
Beck 1-ton	1	1,650	34x3	34x3	Cont.	4-3½x5	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
Beck A	1½	1,850	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
Beck B	1½ / 2	2,050	34x3½	34x6	Cont.	4-3½x5	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
Beck C	2 / 2½	2,450	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
Beck D	3 / 3½	3,700	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	.....	.....	.....	.....	worm	Shel.	Lavn.
Bell	1½	.....	32x3½	32x4	Buda	4-3½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	.....	.....	Russel	.....
Bell O	2½	.....	34x4	34x6	Buda	4-4½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	.....	in-g.	Russel	Gem.
Belmont AA	¾	1,150	31x4	31x4	.....	4-3½x5	Conn.	Dyn.	Pierce	Zenith	G-Lees	G-Lees	in-g.	Clark	Lavn.
Belmont BB	1½	1 950	34x4½	36x5	Cont.	4-3½x5½	Eise.	Dyn.	Pierce	Zenith	G-Lees	G-Lees	in-g.	Clark	Lavn.
Bessemer G	1	1,600	34x3	34x4	Cont.	4-3½x5	Bosch	Opt.	none	Ray.	Fuller	Fuller	in g.	Torbn.	Ross
Bessemer H-2	1½	2,085	36x3½	36x5	Cont.	4-3½x5	Bosch	Opt.	Pierce	Ray.	B.&B.	.....	in-g.	Torbn.	Ross
Bessemer J-2	2½	2,785	36x4	36x4d	Cont.	4-4½x5½	Bosch	Opt.	Pierce	Ray.	B.&B.	B-Lipe	in-g.	Torbn.	Ross
Bessemer K-2	4	4,285	36x5	36x10	Cont.	4-4½x5½	Bosch	Opt.	Pierce	Ray.	B.&B.	B-Lipe	in-g.	Torbn.	Ross
Bethlehem K	¾	1,495	34x4½	35x5	Own	4-3½x5	Bosch	G&D	none	Zenith	B.&B.	Det.	bevel	Stan.P	Ross
Bethlehem DG	1½	2,095	34x3½	34x5	Own	4-4x5½	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Bethlehem EH	2½	2,495	34x4	34x6	Own	4-4x5½	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Bethlehem FJ	3½	3,595	34x4	34x5d	Own	4-4½x5½	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Bets	2½	2,700	36x4	36x7	Buda	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Bollstrom A	5	.....	36x6	36x6	Own	4-4½x5½	Bosch	none	.....	Strom.	.....	.....	Own	in g.	Own
Brinton H	1	1,500	33x4½*	33x4½*	Wis.	4-3½x5	.....	.....	none	.....	.....	.....	worm	Shel.	Ross
Brinton F	2½	3,400	36x4	36x6	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Duplex Limited A	1½	2,775	35x5	38x7	Hink.	4-4x5½	West.	West.	.....	Strom.	Covert	Covert	worm	Shel.	Ross
Duplex E	3	4,250	36x8	36x8	Buda	-4½x5½	Eise	Own	none	Strom.	B-Lipe	B-Lipe	in-g.	Own	Wohl.
Duty	2	1,490	34x3½	34x5	Gray	4-3½x5	Simms	.....	.....	Zenith	Covert	Covert	in-g.	Russel	Ditw.
Eagle	2	.....	34x3½	34x6	Buda	4-3½x5½	Eise.	.....	.....	Zenith	Covert	Covert	worm	Lavn.	.....
Economy T-LHD	¾	1,250	35x5	35x5	Own	4-3 11/16x5½	A-L	A-L	none	none	Zenith	Warner	in-g	Torbn	Jacox
Elmira C	½	.....	29x3	28x3	Perk.	4-3½x4	A-K	Carl.	none	Holl.*	Own	Own	bevel	Own	Own
Ellsworth 25-A	1½	.....	30x3½	30x3½	Lyc.	4-3½x5	Conn.	.....	none	Car.	Lyc.	G-Lees	bevel	Wis.	Foster
Erie	1½	.....	34x3½	36x5	Buda	4-3½x5	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
Erie	2	.....	34x3½	36x5	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
Erie	2½	.....	34x4	36x5	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
Erie	3½	.....	36x5	40x5d	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
Fageol	1½	.....	34x3½	34x6	Wauk.	4-3½x5½	Dixie	opt.	Wauk.	Zenith	B.&B.	Own	worm	Stand.	Ross *
Fageol	2½	3,400	34x4	36x7	Wauk.	4-4½x5½	Dixie	opt.	Wauk.	Zenith	B-Lipe	Own	worm	Timkn.	Ross
Fageol	3½	4,500	36x5	36x5d	Wauk.	4-4½x6½	Dixie	opt.	Wauk.	Zenith	B-Lipe	Own	worm	Timkn.	Ross
Fageol	5	5,300	36x6	40x6d	Wauk.	4-4½x6½	Dixie	opt.	Wauk.	Zenith	B-Lipe	Own	worm	Timkn.	Ross
Famous B-10	1	.....	36x3½	36x4	Cont.	4-3½x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	in-g.	Clark	Ross
Famous B-12	1½	.....	36x3½	36x5	Cont.	4 3½x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	in-g.	Clark	Ross
Fargo P	2	2,200	36x4	36x6	Cont.	4-3½x5	Bosch	none	Mon.	Ray.	Fuller	Fuller	in-g.	Russel	Jacox
Federal SD	1	2,400	35x5*	36x6*	Cont.	4-3½x5	Eise.	A-L	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal TE	1½	2 600	36x3½	36x5	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B-Lipe	Own	worm	Timkn.	Gem.
Federal UE	2	2,900	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal Trac	3	3,050	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal WD	3½	3,850	36x5	36x5d	Cont	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal XC	5	4,550	36x6	40x6d	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal Trac	7	4,025	36x5	36x5d	Cont	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Ford TT	1	600	30x3½*	32x4½*	Own	4-3½x4	Own	.....	.....	opt.	Own	Own	worm	Own	Own
Forschler	1	2,100	36x3	36x4	Cont.	4-3½x5	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	1½	2,375	36x3½	36x5	Cont.	4-3½x5	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	2	2,750	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	3	3,450	36x4	36x8	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
F. W. D. B	3	4,500	36x6	36x6	Wis.	4-4½x5½	Eise.	.....	Pierce	Strom.	M.&E.	Cotta	bevel	Own	Ross
Fulton FX	1½	1,850	34x3½	34x5	H-S	4-3½x5 1/8	Simms	.....	.....	Carter	B.&B.	Own	in-g.	Russel	Lavn.
Fulton C	2	2,350	34x4	34x6	H-S	4-3½x5	Simms	.....	.....	Carter	B.&B.	Covert	in-g.	Russel	Lavn.
Gabriel C	1	2,000	35x5	35x5	Buda	4-4½x5½	Bosch	L-N	none	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Gabriel E	2	3,250	36x4*	36x7*	Buda	4-4½x5½	Bosch	L-N	Dyplx.	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Gabriel F	4	4,300	36x5	40x6d*	Buda	4-4½x6	Bosch	L-N	Duplx.	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Garford 25	1½	2,090	36x3½	36x4	Buda	4-3½x5½	Split.	West.	Mon.	Strom.	B-Lipe	Own	worm	Timkn.	Ross
Garford 70-H	2	3,450	36x4	36x7	Buda	4-4½x5½	Split.	West.	Duplx.	Strom.	B-Lipe	Own	worm	Timkn.	Ross
Garford 77-D	3½	4,390	36x5	36x5d	.....	4-4½x6	Split.	.....	Duplx.	Strom.	.....	Own	worm	Timkn.	Ross
Garford 68	5	5,200	36x5	40x6d	Wis.	4-4½x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	Own	chain	Own	Ross
Garford 69	6	5,000	36x5	40x7d	Wis.	4-5 1/2x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	Own	chain	Own	Ross
Gary F	1	2,100	36x3½	36x4	Buda	4-3½x5	Eise.	.....	McCan.	Master	Fuller	Fuller	worm	Timkn.	Ross
Gary GT	1½	2,550	36x3½	36x5	Buda	4-4x5½	Eise.	.....	McCan.	Master	Fuller	Fuller	worm	Timkn.	Ross
Gary J	2½	3,150	36x4	36x7	Buda	4-4½x5½	Eise.	.....	McCan.	Master	B-Lipe	B-Lipe	worm	Timkn.	Ross
Gary KL	3½	4,150	36x5	40x5d	Buda	4-4½x6	Eise.	.....	McCan.	Master	B-Lipe	B-Lipe	worm	Timkn.	Ross
Gary M	5	5,150	36x6	40x6d	Buda	4-5x6½	Eise.	.....	McCan.	Master	B-Lipe	B-Lipe	worm	Timkn.	Ross
Gersix M	1½	2,850	36x3½	36x6	Buda	4-4x5½	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Own	Ross
Gersix K	2½	3,350	36x4	36x7	Buda	4-4½x5½	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Own	Ross
Gersix L	3½	4,350	36x5	40x5d	Buda	4-4½x6	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Own	Ross
Giant 15	1	1,950	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Jacx.
Giant 14	1½	2,375	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Jacx.
Giant 16	2	2,850	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Ross
Giant 17	3½	3,850	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
G. M. C. 16	½	.....	35x5*	35x5*	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	bevel	.....	Jacx.
G. M. C. 31	1½	.....	36x3½	36x5	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C. 41	2	.....	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C. 71	3½	.....	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C. 101	5	.....	36x6	40x6d	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
Graham A	1½	2,295	35x5	36x6	Cont.	4-3½x4	Eise.	.....	Mon.	Strom.	Fuller	Fuller	in-g.	Torbn.	Lavn.
Gramm-Bernstein 15	1½	.....	36x3½	36x5	Cont.	4-3½x5	N. E.	N. E.	.....	Strom.	Fuller	Fuller	in-g.	Clark	Ross

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Dulepx; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Rugles, Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespear; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe Brown-Line; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B.Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn, Torbenson; Key-H., Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chcgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn. Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Name and Model	Tons apacity	Chassis Price	Front Tires	Rear Tires	Nam of Engine	No Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Briscoe T-34	1	.....	33x4*	34x4	Own	4-3½x5	Conn.	none	Own	Buick	Own	Own	in g.	Russel	Lavn.
Brockway S-2	1½	2,250	36x3½	36x5	Cont.	4-3½x5	Eise.	none	none	Strom.	B Lipe	B Lipe	worm	Shel.	Gem.
Brockway K-4	2½	3,200	36x4	36x7	Cont.	4-4½x5½	Eise.	none	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Brockway R-2	3½	4,100	36x5	36x5d	Cont.	4-4½x5½	Eise.	none	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Brockway T	5	5,250	36x6	40x6d	Cont.	4-4½x6	Eise.	.....	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Champion	...	1,000	32x4	32x4	Light	4-3½x4½	A-K	.....	none	.....	.....	.....	bevel	.....	.....
Chevrolet T	1	1,325	33x4	35x5*	Own	4-3 11/16x5½	Remy	A-L*	Mon.	Zenith	Own	Warner	worm	.....	Warn.
Clydesdale	1	.....	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	S.P.	Ross
Clydesdale 42	1½	2,445	36x3½	36x6	Cont.	4-3½x5	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale 65X	2½	3,200	36x4	36x8	Cont.	4-4½x5½	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale 90	3½	4,075	36x5	40x10	Cont.	4-4½x5½	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale 120B	5	5,025	36x6	40x12	Cont.	4-4½x6	Bosch	.....	Own	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Collier 18	1	.....	34x4	34x5	Cont.	4-3½x5	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chego.	Ross
Collier 19	1½	.....	36x6	36x6	Cont	4-3½x5	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chego.	Ross
Collier 20	2	.....	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chego.	Ross
Columbia F	1	1,750	34x3½	34x4	Cont.	4-3½x5	Dixie	.....	Pierce	Shake.	B.&B.	Covert	in-g.	Russel	Own
Columbia H	1½	2,200	34x3½	34x5	Hink.	4-3½x5½	Bosch	.....	Hink.	Strom.	Det.	Covert	in-g.	Russel	.....
Columbia G	2½	2,750	36x4	36x7	Hink.	4-4 x5½	Bosch	Remy	Hink.	Strom.	Det.	Covert	in-g.	Russel	Own
Comet	1½	1,950	34x4	34x4	Lyc.	4-3½x5	Delco.	Dneto.	.....	Carter	B.&B.	Muncie	worm	Chego.	C.A.S
Commerce E	1	1,855	34x3	34x4	Cont.	4-3½x5	Eise.	Bijur*	none	Zenith *	Det.	Det.	in-g.	Torbn.	Jacox
Commerce EP	2	2,225	36x6	36x6	Cont.	4-3½x5	Eise.	Bijur*	none	Zenith *	Det.	Det.	in-g.	Torbn.	Jacox
Concord A	1½	2,350	36x3½	36x5	Buda	4-4½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Concord B	2½	2,850	36x4	36x4d	Buda	4-4½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Conestoga 12	¾	.....	32x4½	32x4½	Cont.	4-3½x5	Simms	.....	.....	Strom.	B.&B.	Muncie	in-g.	Torbn.	C.A.S.
Conestoga 20	1	2,100	34x3½	34x5	Cont.	4-3½x5	Simms	.....	.....	Strom.	Fuller	Fuller	worm	Wis.	Ross
Conestoga 30	2	2,700	36x4	36x4d	Cont.	4-3½x5	Simms	.....	Dplx.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Corbitt E	1	2,400	34x3½	34x4	Cont.	4-3½x5	Eise.	Disco*	Simplx.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Corbitt D	1½	2,800	36x3½	36x5	Cont.	4-3½x5	Eise.	Disco*	Simplx.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Corbitt C	2	3,500	..x4	36x7	Cont.	4-4½x5½	Eise.	none	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Corbitt B	2½	3,650	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Corbitt A	3½	4,500	36x5	36x5d	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Corbitt AA	5	5,500	36x6	40x6d	Cont.	4-4½x6	Eise.	none	Pierce	Strom.	Detlaff	B-Lipe	worm	Shel.	Ross
Dart H	1	2,100	34x3½	34x5	Buda	4-3½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart S	1½	2,250	34x3½	34x6	Buda	4-3½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart M	2½	3,000	36x4	36x7	Buda	4-4½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart W	3½	4,000	36x5	36x10	Buda	4-4½x6	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Day-Elder A	1	1,995	34x3	34x4	Cont.	4-3½x5	Eise.	.....	.....	Zenith	Covert	Covert	worm	Shel.	Gem.
Day-Elder B	1½	2,300	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Zenith	Covert	Covert	worm	Shel.	Gem.
Day-Elder D	2	2,750	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Mon.	Zenith	Covert	Covert	worm	Shel.	Gem.
Day-Elder C	2½	2,950	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Mon.	Zenith	Covert	Covert	worm	Shel.	Gem.
Day-Elder F	3½	3,700	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Day-Elder E	5	4,600	36x5	40x6d	Buda	4-4½x6	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Dearborn, F	1½	1,980	34x4*	34x5	Cont.	4-3½x5	Bosch	.....	.....	Strom.	Fuller	Fuller	worm	Stand.	Lavn.
Dearborn, 48	2	2,390	34x4½	34x7	Buda	4-3½x5½	Bosch	.....	.....	Strom.	Fuller	Fuller	worm	Stand.	Det.
Defiance, D	1½	2,450	35x5	36x6	Cont.	4-3½x5	Eise.	.....	none	Strom.	B.&B.	G-Lees	in-g.	Torbn.	Own
Defiance, E	2	2,650	35x5	38x7	Cont.	4-3½x5	Eise.	.....	none	Strom.	B.&B.	G-Lees	in-g.	Torbn.	Own
DeKalb, E-2	2	2,100	34x3½	36x5	Cont.	4-4½x5½	Eise.	none	none	Master	Fuller	Fuller	worm	Timkn.	Ross
DeKalb, E-2½	2½	2,600	36x4	36x6	Cont.	4-4½x5½	Eise.	none	none	Master	Fuller	Fuller	worm	Timkn.	Ross
Denby, 12	1	1,950	35x5	36x6	Cont.	4-3½x5	Eise.	none	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Ross
Denby, 134	2	2,450	36x3½	36x6	Cont.	4-3½x5	Eise.	none	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem.
Denby, 25	3	3,250	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem.
Denby, 27	4	4,150	36x5	36x10	Cont.	4-4½x5½	Eise.	.....	Simplx.	Strom.	Own	Warner	in-g.	Clark	Ross
Denby, 210	5	4,900	36x6	40x12	Cont.	4-4½x5½	Eise.	Simp.	none	Simp.	Strom.	Warner	in-g.	Clark	Ross
Dependable	1½	2,150	34x3½	34x5	Buda	4-3½x5½	Dixie	.....	Pierce	Strom.	Fuller	Fuller	worm	Wis.	Ross
Dependable	2½	2,750	36x4	36x7	Buda	4-4½x5½	Dixie	.....	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
Diamond-T, FS	1½	2,675	36x3½	36x5	.....	4-3½x5½	Bosch	.....	.....	Strom.	.....	.....	worm	Wis.	Gen.
Diamond, T, U	2	3,285	36x4	36x7	.....	4-4 x5½	Bosch	.....	.....	Strom.	.....	.....	worm	Timkn.	Gem.
Diamond, T, LB	3½	4,390	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	.....	.....
Diamond-T, S	5	5,785	36x6	40x6d	.....	4-4½x6	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Diehl, A	1	1,575	34x4½	35x5	Cont.	4-3½x5	Bosch	Presto	none	Zenith	B.&B.	Durstn.	in-g.	Torbn.	Jacox.
Doane	2	3,750	36x5	36x7	Wauk.	4-4½x5½	Bosch	.....	.....	Master	B-Lipe	B-Lipe	Chain	Own	Own
Doane	6	5,825	36x6	40x6d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Master	B-Lipe	.....	Chain	Own	Lavn.
Dodge	¾	.....	32x3½	32x3½	Own	4-3½x4½	Own	N.E.	none	Stew.	Own	Own	.....	Own	Own
Dorris, K4	2	3,285	36x4	36x7	Own	4-4½x5½	Bosch	West.*	Own	Strom.	W.G.Co	W.G.Co	worm	Timkn.	Ross
Dorris, K7	3	4,200	36x5	36x10	Own	4-4½x5½	Bosch	West.*	Own	Strom.	W.G.Co	W.G.Co	worm	Timkn.	Ross
Douglas C	1	1,790	34x4½	35x5	Buda	4-3½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Douglas D	1½	2 175	35x5	36x6	Buda	4-4½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Douglas E	2½	2,750	36x6	40x8	Buda	4-4½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Douglas F	2½	3,025	36x6	40x8	Buda	4-4½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	worm	Wis.	Ross

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Gramm-Bernstein 65	1½	.....	36x3½	36x5	Cont.	4-3¾x5	N. E.	N. E.	.....	Strom.	Fuller	Own	worm	Stan-P	Ross
Gramm-Bernstein 20	2	.....	36x4	36x7	Cont.	4-4¼x5½	N. E.	N. E.	.....	Strom.	Fuller	Own	worm	Shel.	Ross
Gramm-Bernstein 25	2½	.....	36x4	36x4d	Hink.	4-4¼x5½	Eise.	N. E.	.....	Strom.	Own	Own	worm	Stan-P	Ross
Gramm-Bernstein 35	3½	.....	36x5	40x5d	Hink.	4-4½x5½	Eise.	N. E.	.....	Strom.	Own	Own	worm	Stan-P	Ross
Gramm-Bernstein 50	5	.....	36x6	40x6d	Cont.	4-4½x6	Eise.	N. E.	Hink.	Strom.	Own	Own	worm	Stan-P	Ross
Grant 17	...	.....	35x5	38x7	Cont.	4-3¾x5	Dixie	Remy	Pierce	Car.*	B-Lipe	B-Lipe	in-g.	Torbn.	Jacx.
Hahn J-4	1	.....	36x3½	36x5	Cont.	4-3¾x5	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Shel.	Ross
Hahn CD	1½	.....	36x3½	36x6	Cont.	4-4¼x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn DE	2	.....	36x4	36x7	Cont.	4-4¼x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn EE	2½	.....	36x4	36x8	Cont.	4-4¼x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn F	3½	.....	36x5	36x10	Cont	4-4¼x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	wcrm	Timkn.	Ross
Hahn FE	5	.....	36x6	40x12	Cont.	4-4½x6	Opt.	.....	Pierce	Opt	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hal-Fur D	1	2,000	35x5	35x5	Hink.	4-4x5½	Bosch	West.	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Hal-Fur B	2½	2,750	35x5	36x7	Hink.	4-4½x5½	Bosch	none	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem
Hall	2	2,875	36x4	36x4d	Cont.	4-4¼x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem
Hall	3½	3,750	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	5	4,850	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	7	4,850	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	chain	Timkn.	Gem.
Harvey WEA	1½	2,550	34x3½	34x5	Buda	4-4½x5½	Bosch	.....	Mon.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Harvey WFA	2½	3,300	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Harvey WHA	3½	4,300	36x5	36x5d	Buda	4-4½x6	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Harvey WKA	5	5,200	36x6	40x6d	Buda	4-4½x6	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Hawkeye K	1½	1,995	34x3½	34x5	Buda	4-3½x5½	Eise.	.....	Simplx.	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Hawkeye M	2	2,650	36x4	36x6	Buda	4-4½x5½	Eise.	West.	Simplx.	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Hendrickson	2½	3,200	36x4	36x7	Buda	4-4½x5½	.....	.....	.....	Strom.	Fuller	.....	worm	Timkn.	Ross
Hendrickson	3½	4,000	36x5	36x5d	Buda	4-4½x5½	.....	.....	.....	Strom.	Fuller	.....	worm	Timkn.	Ross
Hendrickson	5	5,250	36x6	40x6d	.....	4-5x6	.....	.....	.....	Strom.	.....	.....	worm	Timkn.	Ross
Highway Kn't A	4	5,000	36x5	36x6	Knight	4-4x6	Eise.	Wag.	Mon.	Zenith	.....	.....	worm	Shel.	Ross
Highway Kn't	5	5,800	36x5	40x6d	Knight	4-4x6	Eise.	Wag.	Mon.	Zenith	.....	.....	worm	Shel.	Ross
Huffman C	1½	1,695	34x3½	34x6	Buda	4-3¾x5	Dixie	.....	.....	Zenith	Fuller	Fuller	worm	Torbn.	Lavn.
Huffman B	1½	1,895	34x3½	34x6	Cont.	4-3¾x5	Dixie	.....	.....	Zenith	Fuller	Fuller	worm	Chgo.	Lavn.
Hurlburt A	1½	2,850	34x4	34x5	Buda	4-4½x5½	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Hurlburt B	2½	3,750	36x4	36x4d	Buda	4-4½x5½	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Hurlburt C	3½	4,400	36x5	36x5d	Buda	4-4½x6	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Hurlburt D	5½	5,250	36x5	40x6	Buda	4-4½x6	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Independent F	1–2	.....	36x3½	36x5	Cont.	4-3¾x5	Eise.	.....	Pierce	Scheb.	Fuller	Fuller	worm	Wis.	Ross
Indiana 12	1½	.....	34x3½	34x5	Wauk.	4-3¾x5½	Eise.	West.	Wauk.	Strom.	B.&B.	Covert	worm	Shel.	Wol.
Indiana 20	2	.....	36x4	36x7	Ruten.	4-4½x5½	Eise.	West.	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana 25	2½	.....	36x4	36x8	.....	4-4½x5½	.....	.....	.....	.....	.....	.....	worm	.....	.....
Indiana 35	3½	.....	36x5	36x5d	Ruten.	4-4½x5½	Eise.	West	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana 50	5	.....	36x5	40x6d	Wauk.	4-4½x6½	Eise.	West.	Wauk.	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
International H	¾	1,750	36x3½	36x3½	Own	4-3½x5½	Bosch	N. E.*	Own	Ens.	Own	Own	in-g.	Own	Own
International F	1	1,950	36x3½	36x4	Own	4-3½x5½	Bosch	N. E.*	Own	Ens.	Own	Own	in-g.	Own	Own
International K	1½	2,300	36x3½	36x5	Own	4-3½x5½	Bosch	N. E.*	Own	Ens.	Own	Own	in-g.	Own	Own
International G	2	2,700	36x4	36x6	Own	4-4½x5	Split.	N. E.*	Own	Ens.*	Own	Own	in-g.	Own	Own
International L	3½	4,500	36x5	40x10	Own	4-4½x5	Split.	N. E.*	Own	Ens.*	Own	B-Lipe	in-g.	Own	Own
Jackson C	3½	4,250	36x7	36x7	Cont.	4-4½x5½	Eise.	Eise.	Pierce	Strom.	B.&B.	Own	bevel	Own	Ross
Jumbo 15	1½	2,850	36x3½	36x5	Buda	4-3½x5½	N. E.	N. E.	none	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo 20	2	3,100	35x5	38x7	Buda	4-3½x5½	N. E.	N. E.	none	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo 25	2½	3,450	36x4	36x7	Buda	4-4½x5½	Eise.	Eise.	Duplx.	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo 30	3	3,950	36x6	42x9	Buda	4-4½x5½	Eise.	Eise.	Duplx.	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo 35	3½	4,550	36x5	36x10	Buda	4-4½x6	Eise.	Eise.	Simplx.	Zenith	B-Lipe	B-Lipe	in-g.	Clark	Jacx.
Jumbo 40	4	5,200	38x7	44x10	Buda	4-4½x6	Eise.	Eise.	Simplx.	Zenith	B-Lipe	B-Lipe	in-g.	Clark	Jacx.
Kalamazoo G	1½	.....	34x4	34x5	Cont.	4-3¾x5	Bosch	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Wis.	Ross
Kalamazoo H	2½	.....	34x5	36x7	Wis.	4-4x6	Bosch	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Kalamazoo K	3½	.....	36x5	36x5d	Wis.	4-4½x6	Bosch	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Kankakee E	2½	2,875	34x4	36x6	Cont.	6-3½x5½	Delco	Delco	.....	Zenith	Warner	Warner	in-g.	Russel	Ross

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc.,Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swarts; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Rugles, Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B.Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn, Torbenson; Key-H., Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury Ind., Industrial; Chgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Motor Age Monthly Guide to Truck Specifications—Continued

These tables are revised and brought up to date monthly

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Kearns	3/4	1,550	32x4½	32x4½	Light	4-3½x4½	Berl.	Dyn.	Mon.	Zenith	B.&B.	G-L	in-g.	Torbn.	Lavn.
Kearns	1½	2,100	34x3½	34x6	H-S	4-3½x5	Berl.	none	Pierce	Zenith	B.&B.	G-L	in-g.	Torbn.	Lavn.
Keldon, 19	2	2,885	36x4	36x7	Buda	4-4½x5½	Eise.	none	Pierce	Strom.	Fuller	Fuller	in-g.	Russel	Ross
Kelly-S., K-31	1½	3,000	36x3½	36x6	Cwn	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	Chain	Own	Gem.
Kelly-S., K-32	1½	3,000	36x3½	36x6	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	worm	Own	Gem.
Kelly-S., K-35	2½	3,500	36x4	36x4d	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	Chain	Own	Gem.
Kelly-S., K-36	2½	3,500	36x4	36x4d	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	worm	Own	Gem.
Kelly-S., K-40	3½	4,400	36x4	40x5d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Kelly-S., K-45	4	4,500	36x5	40x6d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Kelly-S., K-50	5	5,150	36x6	40x6d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Kelly-S., K-60	6	5,500	36x6	40x7d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Keystone	1	1,375	31x4*	33x5*	Own	4-3½x4	A-L	.....	.....	Tillot.	Own	Own	in-g.	Torbn.	Own
Keystone	2	2,100	35x5*	38x7*	Buda	4-3½x5½	Perl.	none	Pierce	Zenith	Fuller	Fuller	in-g.	Russel	Ross
Kimball, B	½	3,675	36x4	36x7	Wis.	4-4 x6	Eise.	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, C	2½	3,975	36x4	36x7	Wis.	4-4½x6	Eise.	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, K	3	4,400	36x4	36x8	Wis.	4-4½x5½	Berl.	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, E	4	5,000	36x5	40x10	Wis.	4-5x5½	Berl.	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Kimball, F	5	5,975	36x6	40x12	Wis.	4-5½x6	Berl.	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Kissel	¾	1,875	34x4½*	34x4½	Own	4-3½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	.....	Own	Jacx.
Kissel	1½	2,975	36x3½	36x5	Own	4-3½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Jacx.
Kissel	2	2,975	36x4	36x7	Own	4-4½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Timkn.	Lavn.
Kissel	3½	3,975	36x5	36x5d	Own	4-4½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Ross
Kissel	5	4,785	36x6	36x6d	Own	4-4½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Ross
Kimball, A	1½	3,075	36x3½	36x5	Wis.	4-4x5	Bosch	.....	Duplx.	Zenith	.....	B-Lipe	worm	Shel.	Lavn.
Kleiber, AA	1	.....	34x3½	34x5	Cont.	4-3½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Kleiber, A	1½	.....	36x3½	36x6	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Shel.	Ross
Kleiber, BB	2	.....	36x4	36x3½d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Kleiber, B	2½	.....	36x5	36x4d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Shel.	Ross
Kleiber, C	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Knox, 35-Tractor	5	6,000	36x4	38x6d	Own	4-5 x5½	Berl.	G.&D.	None	Zenith	Own	Own	Chain	Own	Ross
Knox, 36-Tractor	10	6,500	36x4	38x6d	Own	4-5 x5½	Berl.	G.&D.	None	Zenith	Own	Own	Chain	Own	Ross
Koehler, C	1½	1,985	34x3	34x5	H-S	4-3½x5	Eise.	none	Simplx.	Zenith	Mech.	Mech.	in-g.	Torbn.	Own
Koehler, M	2½	3,365	36x4	36x7	Herc.	4-4 x5½	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Koehler Trac., MT	5	3,450	36x4	36x7	Herc.	4-4 x5½	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Larrabee, U	1½	2,250	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Simplx.	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, EK&SK	2½	3,250	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, EL &SL	3½	4,000	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, SW&EW	5	4,900	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Leudinghaus, KLS	2	2,790	36x4	36x7	Wauk.	4-4½x5½	Split	.....	.....	Wauk.	B.&B	Detroit	worm	Wis.	Lavn.
L. M. C	2½	2,950	36x4	36x4d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B.&B.	.....	in-g.	Russel	.....
Lombard	7	.....	.....	.....	.....	6-5½x7	Simms	.....	Own	Scheb.	.....	.....	worm	.....	.....
Maccar, S	1	2,400	34x3½	34x4	Cont.	4-3½x5	Eise.	none	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, L	1½	2,925	36x4	36x5	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, H	2½	3,500	36x4d	36x4	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, M	3½	4,300	36x5	36x5d	Wis.	4-4½x6	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, G	5½	5,250	36x5	40x6d	Wis.	4-5 x6	Eise.	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Mack, AB	1½	3,000	36x4	36x3½d	Own	4-4 x5	Dixie	none	Pierce	Zenith	B-Lipe	B-Lipe	Chain	Own	Gem.
Mack, AB	1½	3,000	36x4	36x3½d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Mack, AB	2	3,300	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	Chain	Own	Gem.
Mack, AB	2	3,300	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Mack Trac., AB	5	3,400	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack, AC	3½	4,950	36x5	40x5d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack, AC	5	5,500	36x5	40x6d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack, AC	6½	5,750	36x6	40x6d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack Trac., AC	7	4,950	36x5	40x7d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	chain	Own	Gem.
Mack AC	7½	6,000	36x7	40x7d	Own	4-5x6	Dixie	.....	Own	Zenith	Own	Own	chain	Own	Gem.
Mack Trac. AC	10	5,500	36x6	40x6d	Own	4-5x6	Dixie	.....	Own	Zenith	Own	Own	chain	Own	Gem.
Mack Trac. AC	13	5,750	36x6	40x12s	Own	4-5x6	Aero	.....	Own	Zenith	Own	Own	chain	Own	Gem
Mack Trac. AC	15	6,000	36x7	40x7d	Own	4-5x6	Dixie	.....	Own	Zenith	Own	Own	chain	Own	Gem
Master JI	1½	2,390	34x3½	34x5	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	Fuller	Fuller	in-g.	Timkn.	Ross
Master JW	1½	2,490	34x3½	34x5	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	Fuller	Fuller	worm	Timkn.	Ross
Master WL	2	3,190	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master M	2½	2,790	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Timkn	Ross
Master O	2½	2,899	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Timkn	Ross
Paige, 51-18	3½	4,150	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Parker, F20	2	3,500	34x4	36x4d	Wis.	4-4x6	Bosch	West.	Mon.	Strom.	B-Lipe	Fuller	worm	Own	Ross
Parker, J20	3½	4,400	36x5	40x5d	Wis.	4-4½x6	Bosch	West	Mon.	Strom.	B-Lipe	Warner	worm	Own	Ross
Parker, M20	5	5,500	36x6	40x6d	Wis.	4-4½x6	Bosch	West.	Simplx.	Strom.	B-Lipe	Warner	worm	Own	Ross
Patriot, Revere	¾	1,890	35x5*	35x5*	Cont.	4-3½x5	A-K	Bijur	.....	Strom.	B. & B.	Covert	worm	Empire	.....
Patriot, Lincoln	1½	2,650	34x3½	34x3½d	Hink.	4-4x5½	Split	.....	Hink.	Strom.	Covert	Fuller	worm	Empire	Ross
Patriot, Wash	2½	3,650	36x4	36x3½d	Hink.	4-4½x5½	.....	.....	Hink.	Strom.	Covert	Covert	worm	Empire	Ross
Pierce-Arrow, X4	2	4,300	36x4	36x4d	Own	4-4½	Dixie	Vesta	Own	Own	Own	Own	worm	Own	Own
Pierce-Arrow, R9	5	5,500	36x5	40x6d	Own	4-4½x6	Dixie	Vesta	Own	Own	Own	Own	worm	Own	Own
Pioneer All Steel, F	2	2,790	36x4	36x7	Cont.	4-4½x5½	Eise.	None	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Pony	¼	320	28x3	28x3	Own	4-2½x4	A-K	opt.	opt.	Strom.	.....	.....	chain	Own	Own
Power, B	2	2,950	36x4	36x4d	Cont.	4-4½x5½	Simms	None	Pierce	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Ranier, R-11	¾	1,850	34x4½	34x4½	Cont.	4-3½x5½	Simms	opt.	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Ranier, R-9	1	2,050	32x3	32x4	Cont.	4-3½x5	Simms	opt.	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Ranier, R-6	1½	2,150	34x3	34x3	Cont.	4-3½x5½	Simms	opt.	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Ranier, R-8	2	2,650	34x4	34x6	Cont.	4-3½x5½	Simms	opt.	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Reliance, A-10	1½	2,500	36x3½	36x5	Buda	4-4x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	ext-g	Badger	Ross
Reliance, B-20	2½	3,200	36x4	36x4d	Buda	4-4½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Cotta	ext-g	Badger	Ross
Reo, F	1½	1,385	34x4½	34x4½	Own	4-4½x4½	Remy	Remy	none	John.	Own	Own	bevel	Own	Own
Republic, 10	1	.....	34x3	34x3	Cont.	4-3½x5	Eise.	none	Rugles	Strom.	Fuller	Fuller	in-g	Torbn.	Jacx.
Republic, 11X	1½	2,050	34x3½	34x5	Cont.	4-3½x5	Eise.	none	Rugles	Strom.	Fuller	Fuller	in-g	Torbn.	Jacx.
Republic, 19	2½	2,595	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Pharo	Strom.	Fuller	Fuller	in-g	Torbn.	Jacx.
Republic, 20	3½	3,795	36x5	36x10	Cont.	4-4½x5½	Eise.	none	Pharo	Strom.	Fuller	Fuller	in-g	Torbn.	Jacx.
Reynolds	1½	2,650	36x3½	36x6	Own	4-4x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Reynolds	2½	3,350	36x4	36x8	Own	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Reynolds	3½	4,350	36x5	36x5	Own	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Reynolds	5	5,350	36x6	36x6d	Own	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Riker, B	3	4,600	36x5	36x5d	Own	4-4½x6	Berl.	West.	Own	B. & B.	Own	Own	worm	Own	Ross
Riker, BB	4	4,700	36x5	36x6	Own	4-4½x6	Berl.	West.	Own	B. & B.	Own	Own	worm	Own	Ross
Rowe, CDW	2	3,300	34x4	36x3½	Wis.	4-4x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, CDW	2½	3,575	34x4	36x4d	Wis.	4-4x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, CW	1½	2,800	36x6*	36x6*	Wis.	4-3½x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, GSW	3	3,900	36x5	36x5d	Wis.	4x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, GPW	3	4,950	38x7	42x9	H-S	3½x5	A-K	West.	.....	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, HW	4	4,350	36x5	36x6d	Wis.	4½x6	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, FW	5	5,390	36x6	40x6d	Wis.	4½x6	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Sandow, G	1	2,095	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Strom.*	Fuller	Fuller	worm	Shel.	Ross
Sandow, CG	1½	2,390	34x3	34x5	Cont.	4-3½x5	Eise.	.....	.....	Strom.*	Fuller	Fuller	worm	Shel.	Ross
Sandow, J	2½	3,175	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow, I	2	2,575	36x4	36x6	Cont.	4-3½x5	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	in-g	Torbn.	Ross
Sandow, K	3½	4,195	36x5	36x5d	Cont.	4-4½x5	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow, M	5	4,975	36x6	40x6d	Cont.	4-4½x5½	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sanford, W-25	2½	3,290	36x4	36x4d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Sanford, W-35	3½	4,050	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B. & B.	B-Lipe	worm	Shel.	Ross
Sanford, W-50	5	4,950	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B. & B.	B-Lipe	worm	Shel.	Ross
Schacht	2	.....	36x4	36x7	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Hart.	Own	worm	Own	Own
Schacht	2½	.....	36x4	36x4d	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Own	Own	worm	Own	Own
Schacht	3½	.....	36x5	36x5d	Buda	4-4½x6	Bosch	none	Duplx.	Scheb.	Own	Own	worm	Own	Own
Schacht	5	.....	36x5	40x6d	Buda	4-4½x6	Bosch	none	Duplx.	Scheb.	Own	Own	worm	Own	Own
Schwartz, B	1½	2,175	34x3½	34x5	Cont.	4-3½x5	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	in-g	Torbn.	Ross
Schwartz, C	2½	2,675	36x4	36x7	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	in-g	Torbn.	Ross
Schwartz, D	5	4,500	36x6	36x6d	Buda	4-4½x6	Bosch	Bijur	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn
Selden	1½	2,460	34x3½	35x5	Cont.	4-3½x5	Bosch	N. E.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	2½	3,550	36x4	36x7	Cont.	4-4½x5½	Eise.	N. E.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	3½	4,325	36x5	36x10	Cont.	4-4½x5½	Eise.	N. E.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	5	5,770	36x6	40x12	Cont.	4-4½x6	Eise.	Conn.	Cont.	Strom.	Det.	B-Lipe	worm	Timkn.	Gem.
Seneca, L	¾	.....	30x3½	30x3½	LeR.	4-3½x4½	Conn.	A-Ch.	.....	Scheb.	B. & B.	Warren	bevel	Peru	Ditw.
Service, LLO	1	2,460	34x3½	34x5	Buda	4-3½x5½	Eise.	West.*	none	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Service, 31	1½	2,985	36x3½	36x6	Buda	4-4x5½	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 36	1½	3,415	35x5*	38x7*	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 51	2½	3,475	36x4	36x7	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 71	3½	4,285	36x5	36x5d	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 76	3½	4,485	36x5	36x5d	Buda	4-4½x6	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Rugles, Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B.Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H., Keystone-Hindley; Shel., Sheldon: Salsby., Salisbury, Ind., Industrial; Chcgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Master W	2½	3,000	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master A	3½	4,190	36x5	40x5d	Buda	4-4½x	Eise.	opt.	Pierce	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master B	5	5,290	36x6	40x6d	Buda	4-4½x6½	Eise.	opt.	Pierce	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master Trac. T	6	3,050	34x4	36x4d	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Torbn.	Ross
Maxwell	1½	1,322	32x3	32x4	Own	4-3½x4½	A-K	A-L	Own	Spec.	Own	Own	worm	Own	Own
Menominee Hurrytown	1	2,080	34x3½	36x5	Wis.	4-3½x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Menominee H	1½	2,725	36x3½	36x5	Wis.	4-4x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Menominee D	2	3,245	36x4	36x4d	Wis.	4-4x6	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Menominee G	3½	4,270	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Strom.	B. & B.	Cotta	worm	Timkn.	Ross
Menominee J	5	5,450	36x6	40x6d	Wis.	4-4½x5½	Eise.	.....	Mon.	Strom.	B. & B.	Cotta	worm	Timkn.	Ross
Moreland 19-B	1½	2,930	36x3½	36x5	Cont.	4-4¼x5½	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland 19-C	2½	3,775	36x4	36x7	Cont.	4-4¼x5½	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland 19-G	4	4,875	36x5	40x5d	Cont.	4-4½x6	Dixie	.....	Cont.	Miller	Own	Own	worm	Timkn.	Ross
Moreland 19-J	5	5,350	36x6	40x6d	Cont.	4-4½x6	Dixie	.....	Cont.	Miller	Own	Own	worm	Timkn.	Ross
Muskegon 20	2	2,325	36x4	36x6	Cont.	4-4¼x5½	Eise.	.....	Pierce	Detroit	Fuller	Fuller	in-g.	Torbn.	Lavn.
Mutual	2	3,450	36x4	36x8	Wis.	4-4½x6	Bosch	West.	Duplx.	Strom.	H-Shaw	Fuller	worm	Wis.	Ross
Mutual	3½	.....	36x5	.....	Wis.	4-4½x5½	Bosch	West.	Duplx.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Mutual	5	.....	36x6	.....	Wis.	4-5.1x5½	Bosch	West.	Duplx.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Napoleon 9	1	1,535	32x3½	32x4	Gray	4-3½x5	Conn.	A-L	.....	Strom	Fuller	Fuller	in-g.	Clark	Lavn.
Napoleon 11	1½	1,860	34x4	34x5	Gray	4-3½x5	Conn.	A-L	.....	Strom.	Fuller	Fuller	in-g	Clark	Lavn.
Nash 2018	1	1,785	34x4	34x3	Own	4-3½x5½	Eise.	A-L	Simplx.	Strom.	B. & B.	Detroit	in-g	Clark	Jacx.
Nash 3018	2	2,395	34x4	36x6	Own	4-3½x5½	Eise.	A-L	Simplx.	Strom.	B. & B.	Detroit	in-g	Clark	Jacx.
Nash 4017	2	3,250	34x5	36x5	Buda	4-4½x5½	Eise.	none	Simplx.	Strom.	B. & B.	Own	in-g	Own	Lavn.
Nelson & LeM., F	1	2,250	36x3½	36x4	Cont.	4-4½x5½	Bosch	West.*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nelson & LeM., F2	2	.....	36x4	36x7	Cont.	4-4½x5½	Bosch	West.*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nels'n & LeM., F3½	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Bosch	West.*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
N'ls'n & LeM., FC5	5	.....	36x6	40x6d	Cont.	4-4½x6	Bosch	West.*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Netco, D	2	3,100	36x4	36x6	Cont.	4-4½x5½	Eise.	none	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Netco, H	2½	3,500	36x4	36x7	Cont.	4-4½x5½	Eise.	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Niles	1–2	.....	36x4	36x7	Cont.	4–	Eise.	.....	Pierce	Strom.	B. & B.	Covert	.....	Timkn.	Gem.
Noble, A-20	1	.....	30x3½	36x4	Buda	4-3½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, B-30	1½	.....	36x3½	36x5	Buda	4-3½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, C-40	2	.....	36x4	36x7	Buda	4-4x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, D-50	2½	.....	36x4	36x8	Buda	4-4½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, E-70	3½	.....	36x5	36x10	Buda	4-4½x6	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Northway, B-2	2	3,300	36x4	36x4d	Own	4-4x6	Wag.	West.	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
Northway, B-3½	3½	4,300	36x5	40x5d	Own	4-4x6	Wag.	West	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
Norwalk, 2000	1	1,695	34x4*	34x4*	Lyc.	4-3½x5	Delco	Dneto.*	none	Zenith	B. & B.	G-Lees	worm	Stand.	C.A.S.
Norwalk, 3000	1½	2,025	34x4	34x5	Lyc.	4-3½x5	Delco	Dneto.*	none	Zenith	B. & B.	G-Lees	worm	Stand.	C.A.S.
O.K	1½	2,450	36x3½	36x5	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
O.K	2½	3,250	36x4	36x7	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
O.K	3½	4,150	36x5	36x5d	Buda	4-4½x6	Eise.	none	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
Old Hickory, W	1	2,175	36x3½	36x4	Cont.	4-3½x5	Eise.	.....	Pierce	Strom.	B. & B.	G-Lees	worm	Timkn.	Lavn.
Oldsmobile	¾	1,250	35x5*	35x5*	Own	4-3½x5½	A-L	A-L	.....	Zenith	Own	Warner	in-g.	Torbn.	Jacx.
Old Reliable, A	1½	2,350	34x3½	36x6	Wis.	4-4x5	Bosch	opt.	Mon.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Old Reliable, B	2½	3,500	36x4	36x4d	Wis.	4-4½x6	Bosch	opt.	Mon.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Old Reliable, C	3½	4,250	36x5	36x5d	Wis.	4-4½x6	Bosch	opt.	Mon.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Old Reliable, D	5	5,250	36x6	40x6d	Wis.	4-5.1x5½	Bosch	opt.	Dupix.	Strom.	Univ.	Savg.	worm	Shel.	Ross
Old Reliable, K, L & M	7½	6,250	36x6	40x7d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Strom.	Univ.	Savg.	chain	Shel.	Ross
Oneida, A-9	1½	2,350	36x6*	36x6*	Own	4-3½x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Own	Ross
Oneida, B-9	1½	2,750	36x3½	36x6	Own	4-4x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Own	Ross
Oneida, C-9	2½	3,200	36x4	36x7	Own	4-4x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Own	Ross
Oneida, D-9	3½	4,100	36x5	36x10	Own	4-4½x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Timkn.	Ross
Oneida, E-9	5	5,150	36x6	40x12	Own	4-4½x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Timkn.	Ross
Oshkosh	2	3,750	36x6*	36x6*	H-S	4-3½x5	N.E.	N. E.	Duplx.	Zenith	B-Lipe	B-Lipe	bevel	Own	Ross
Packard, E, Size B		3,200	34x3½	34x3½d	Own	4-4⅜x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size C		3,600	34x4	34x4d	Own	4-4⅜x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size D		4,350	36x5	36x5d	Own	4-4½x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size E		4,550	36x5	40x5d	Own	4-4½x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size F		5,450	36x6	40x6d	Own	4-5x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size G		5,700	36x6	40x7d	Own	4-5x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size V		4,100	36x6	38x7	.....	-4⅛x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size X		4,500	36x6	40x8	.....	-4⅛x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size Y		5,500	38x7	44x10	.....	-5x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Paige, 52-19	1½	2,680	34x5	38x7	Hink.	4-4x5½	Bosch	.....	Hink.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	.....
Paige, 50-18	2½	3,150	34x4	34x4d	Cont.	4-4½x5½	Bosch	none	Simplx	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Service, 101	5	5,275	36x6	40x6d	Buda	4-4½x6	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Shaw, M-2	¾	1,975	32x4	32x4	Cont.	4-3½x5	Bosch	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Shaw, M-4	1	2,300	34x3	34x4	Cont.	4-3½x5	Bosch	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Signal, F	1	2,750	34x3½	36x5	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, H	1½	2,925	34x4	36x6	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, J	2½	3,275	34x4	36x8	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, M	3½	4,275	36x5	40x10	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, R	5	5,300	36x6	40x12	Cont.	4-4½x6	Eise.	none	.....	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Southern, A	1	1,495	34x4	34x4	Buda	4-3½x5½	Delco	.....	Pierce	Zenith	B. & B.	.....	.....	.....	.....
Southern, B	1½	1,795	34x4	34x4	Cont	4-3½x5	Delco	.....	Pierce	Zenith	B. & B.	.....	.....	.....	.....
Standard, 56	1	.....	34x3½	34x4	Cont.	4-3½x5	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Standard, 76	2½	.....	36x4	36x7	Cont.	4-4¼x5½	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Standard, 66	3½	.....	36x5	36x5	Cont.	4-4¼x5½	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Standard, 86	5	.....	36x6d	40x6d	Cont.	4-4¼x5½	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Sterling	1½	2,850	36x3½	36x5	Own	4-4x5½	Eise.	.....	Wauk.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sterling	2	3,100	36x4	36x6	Own	4x5½	Eise.	.....	Wauk.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sterling	2½	3,475	36x4	36x4d	Own	4-4½x5½	Eise.	West.	Wauk.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sterling	3½	4,550	36x5	40x5d	Own	4-4½x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	worm	Timkn.	Ross
Sterling, W	5	5,350	36x6	40x6d	Own	4-5x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	worm	Timkn.	Ross
Sterling, C	5	5,600	36x6	40x5d	Own	4-5x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	chain	Own	Ross
Sterling	7½	6,000	36x6	40x7d	Own	4-5x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	chain	Own	Ross
Stewart	¾	1,350	32x4*	32x4*	LeR.	4-3½x4½	Eise.	.....	none	Zenith	B. & B.	Durston	in-g	Clark	C.A.S.
Stewart, 8	1	1,695	34x3½	34x4	Cont.	4-3½x5	Eise.	.....	Spec.	Zenith	B. & B.	Durston	in-g	Clark	Gem.
Stewart, 9	1½	2,250	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Spec.	Zenith	Fuller	Fuller	in-g	Clark	Gem.
Stewart, 7	2	2,875	34x4	34x4d	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	Fuller	Fuller	in-g	Clark	Ross
Stewart, 10	3½	3,895	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	Fuller	Fuller	in-g	Clark	Ross
Stoughton, B	1½	2,200	36x3½	36x5	Wauk.	4-3½x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Stoughton, D	2	2,600	36x4	36x7	Wauk.	4-4x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Stoughton, E	3	3,000	36x4	36x5d	Wauk.	4-4½x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Sullivan, F	1½	2,350	36x4	36x5	Buda	4-3½x4½	Bosch	.....	none	Strom.	.....	Covert	worm	Timkn.	Ross
Sullivan, E	2	2,975	36x4	36x7	Buda	4-4½x5½	Bosch	.....	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sullivan, H	3½	.....	36x5	36x5d	Buda	4-4½x6	Bosch	.....	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Super Truck 50	2½	3,200	36x4	36x8	Wis.	4-4x6	.....	.....	Vesta	Simplx	Zenith	Fuller	.....	worm	Shel.	Lavn.
Super Truck 70	3½	4,100	36x5	40x5d	Wis.	4-4½x6	.....	.....	Vesta	Simplx	Zenith	Fuller	.....	worm	Shel.	Ross
Super Truck 100	5	4,800	36x5	40x6d	Wis.	4-4½x6	.....	.....	Vesta	Simplx	Zenith	Hill	.....	worm	Shel.	Ross
Superior D	1	1,675	34x4½	34x4	Cont.	4-3½x5	Eise.	Opt.	Pierce	Strom.	Fuller	Fuller	in-g	Torbn.	C.A.S.
Superior E	2	2,600	34x4	36x6	Cont.	4-4½x5½	Eise.	Opt.	Pierce	Strom.	Fuller	Fuller	in-g	Torbn.	Ross
Texan	1½	1,525	34x4*	34x5	Lyc.	4-3½x5	Conn.	Bijur	.....	Car.	B. & B.	B-Lipe	worm	Chgo.	C.A.S.
Tiffin A	¾	1,100	35x4½	35x4½*	Cont.	4-3½x5	Bosch	none	none	Scheb.	Det.	Det.	in-g	Russel	Lavn.
Tiffin GW	1½	2,530	36x3½	36x5	Cont.	4-3½x5½	Bosch	none	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
Tiffin MW	2½	3,350	36x4	36x3½d	Cont.	4-4½x5½	Bosch	none	Pierce	Scheb.	Hart.	Fuller	worm	Shel.	Ross
Tiffin PW	3½	4,375	36x5	36x5d	Cont.	4-4½x5½	Bosch	West.*	Pierce	Scheb.	B. & B.	Fuller	worm	Shel.	Ross
Tiffin RW	5	5,250	36x6	40x6d	Cont.	4-4½x6	Bosch	West.	none	Scheb.	B. & B.	Covert	worm	Shel.	Ross
Tiffin SW	9	5,450	36x6	40x12	Cont.	4-4½x6	Bosch	West.*	none	Scheb.	B. & B.	Covert	worm	Shel.	Ross
Titan 2½	2½	3,400	34x4	36x4d	Buda	4-4½x5½	Eise.	none	Simplx.	Strom.	B. & B.	Cotta	in-g	Clark	Wol.
Titan, T	3½	4,400	36x5	40x5d	Buda	4-4½x6	Eise.	West.	Simplx.	Strom.	B. & B.	Cotta	in-g	Clark	Lavn.
Titan, H	6	5,400	36x6	40x6d	Buda	4-4½x6	Eise.	West.	Simplx.	Strom.	B. & B.	Cotta	in-g	Clark	Lavn.
Tower, J	1½	2,820	35x5	38x7	Cont.	4-4½x5½	Bosch	.....	.....	Zenith	.....	.....	worm	.....	Ross
Tower, H	2½	3,385	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	.....	Zenith	Fuller	Fuller	worm	.....	Ross
Tower, G	3½	4,335	36x5	36x5	Cont.	4-4½x5½	Bosch	.....	.....	Zenith	Fuller	Fuller	worm	.....	Ross
Traffic	2	1,495	34x3½	34x5	Cont.	4-3½x5	Bosch	none	none	Carter	Covert	Covert	in-g	Russel	Own
Transport 20	1	1,850	34x3	34x4	Cont.	4-3½x5	Eise.	none	Duplx.	Strom.	Fuller	Fuller	in-g.	Clark	Jack.
Transport, 30	1½	2,250	36x3½	36x5	Cont.	4-3½x5	Eise.	none	Duplx.	Strom.	Fuller	Fuller	in-g.	Clark	Jacx.
Transport, 50	2	2,750	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Duplx.	Strom.	Fuller	Fuller	in-g.	Clark	Jacx.
Traylor, B	1	1,950	34x[illegible]	34x5	Buda	4-3½x5½	Split.	Spec.	Pierce	Zenith	Covert	Covert	.....	Shel.	Ross
Traylor, C	1½	2,750	36x4	36x6	Buda	4-4x5½	Split.	Spec.	Pierce	Zenith	Covert	Covert	.....	Shel.	Ross
Traylor, D	2½	3,250	36x4	36x7	Buda	4-4½x5½	Split.	Spec.	Pierce	Zenith	Covert	Covert	.....	Shel.	Ross
Triangle, AA	¾	1,550	35x5	35x5	H-S	4-3½x5	N. E.	N. E.	none	Strom.	Fuller	Fuller	in-g.	Clark	Gem.
Triangle, A	1½	2,185	34x3½	34x6	Wauk.	4-3½x5½	Eise.	none	Wauk.	Strom.	Fuller	Fuller	in-g.	Clark	Gem.
Triangle, C	2	2,585	36x4	36x6	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Strom.	Fuller	Fuller	in-g.	Clark	Gem.
Triangle, B	2½	2,850	36x7	36x7	Ruten.	4-4½x5½	Eise.	.....	Pierce	Strom.	Fuller	Fuller	in-g.	Clark	Gem.
Twin City	2	.....	36x4	36x7	Buda	4-4x5½	Bosch	.....	Simplx.	Strom.	Fuller	Fuller	in-g.	Clark	Ross
Twin City	3½	.....	36x5	40x5d	Own	4-4½x6	Bosch	.....	Own	Opt.	B. & B.	Fuller	worm	Timkn.	Ross
Ultimate	1½	.....	.....	.....	Buda	4-4½x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	Ross
Union, F	2½	3,150	36x5	36x8	Wis.	4-4x6	Eise.	opt.	Duplx.	Scheb.	Fuller	Fuller	in-g.	Russel	Ross
Union, H	4	3,975	36x6	36x10	Wis.	4-4½x6	Eise.	opt.	Duplx.	Scheb.	Fuller	Fuller	in-g.	Russel	Ross
United, A	1½	2,100	36x3½	36x6	Buda	4-3½x5½	Eise.	opt.	Simplx*	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Ross
United, B	2½	2,850	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Ross
United, C	3½	3,750	36x5	36x5d	Buda	4-4½x5½	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Ross

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swarts; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Rugles, Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B.Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H., Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury, Ind., Industrial; Chgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Motor Age Monthly Guide to Truck Specifications—Concluded

These tables are revised and brought up to date monthly

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
United, V	5	4,950	36x5	40x6d	Buda	4-41x6	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Ross
U. S., N	1½	2,250	36x3½	36x5	Cont.	4-33x5	Eise.	opt.	none	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Lavn.
U. S., N. W	1½	2,550	36x3½	36x5	Cont.	4-33x5	Eise.	opt.	none	Strom.	B-Lipe	B-Lipe	worm	Shel.	Lavn.
U. S., R	2½	3,850	36x4	36x4d	Own	4-4½x5½	Eise.	opt.	Own	Strom.	B-Lipe	B-Lipe	worm	Shel.	Lavn.
U. S., S	3½	4,450	36x5	36x5d	Own	4-4½x5½	Eise.	opt.	Own	Strom.	B-Lipe	B-Lipe	worm	Shel.	Lavn.
U. S., T	5	5,600	36x6	40x6d	Own	4-4½x6½	Eise.	opt.	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Victor	1½	2,050	34x4	34x5	Cont.	4-33x5	Eise.	opt.	none	Strom.	Fuller	Fuller	Opt.	.....	Ross
Veile, 46	1½	1,925	36x3½	36x5	Cont.	4-33x5	Eise.	opt.	none	Strom.	B. & B	Durst.	in-g.	Torbn.	Ross
Vim, 27	½	1,005	31x4	31x4	Own	4-3x4½	West.	opt.	none	Zenith	Own	Own	worm	Shel.	C.A.S.
Vim, 28	½	1,350	32x4½	32x4½	Own	4-3x4½	Berl.	opt.	none	Zenith	Own	Own	worm	Shel.	C.A.S.
Vim, 25	1	2,195	35x5	35x5	Herc.	4-33x5½	A-K	West.	none	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 22	2	3,150	36x6	36x6	Herc.	4-33x5½	Split.	none	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 23	3	3,950	36x5	36x5d	Herc.	4-4½x5½	Split.	none	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Walker Johnson, B	2½	2,890	36x4	36x8	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Walker, MO	3	.....	40x4d	40x4d	Own	4-4½x6	.....	none	Own	Zenith	Own	Own	ext-g.	Own	Own
Walker, S	5	5,500	36x6	40x6d	Wauk.	4-4½x6½	Simms	West.	Own	Strom.	B-Lipe	Warn.	in-g.	Own	Ross
Ward La France, 2-B	2½	3,590	36x4	30x7	.....	4-4½x5½	Bosch	West.	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Ward La France, 4-A	3½	4,490	36x5	36x5d	.....	4-4½x6½	Bosch	West.	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Ward La France, 5-A	5	5,490	36x6	40x6d	.....	4-5x6½	Bosch	West.	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Watson	¾	1,750	34x4½	34x4d	Wauk.	4-33x5½	Conn.	Dyn.	Wauk.	John.	B-Lipe	B-Lipe	worm	Own	Lavn.
Watson	3½	.....	36x5	36x10	Cont.	4-4½x5½	Simms	none	Pierce	Strom.*	B-Lipe	B-Lipe	worm	Wis.	Gem.
White, 15	¾	2,400	34x4½	34x4½	Own	4-33x5	.....	.....	none	Own	Own	bevel	Own	Own	Own
White, 20	2	3,300	36x4	30x7	Own	4-33x5½	.....	.....	none	Own	Own	d-rd	Own	Own	Own
White, 40	3	4,500	36x5	40x5d	Own	4-33x5½	.....	.....	none	Own*	Own	d-rd	Own	Own	Own
White, 45	5	5,000	36x6	40x6d	Own	4-4½x5½	.....	.....	Own	Own*	Own	d-rd	Own	Own	Own
White Hickory, E	1	2,350	35x5	35x5	Cont.	4-33x5	Eise.	none	Simplx.	Strom.	Fuller	Fuller	worm	Timkn.	Ross
White Hickory, H	1½	2,475	36x5	36x5	Cont.	4-33x5	Eise.	none	Simplx.	Strom.	Fuller	Fuller	worm	Timkn.	Ross

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
White Hickory, K	2½	3,075	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Simplx	Strom.	Fuller	Fuller	worm	Timkn.	Lavn.
Wichita, L	1½	2,600	36x3½	36x5	Own	4-33x5	.....	.....	Wauk.	Strom.	Own	Cotta.	worm	Shel.	Ross
Wichita, M	2	2,800	36x3½	36x6	Own	4-33x5½	.....	.....	Wauk.	Strom.	Own	Cotta.	worm	Shel.	Ross
Wichita, R	2½	3,000	36x4	36x7	Wauk.	4-33x5½	.....	.....	Duplx.	Strom.	Hart.	Cotta.	worm	Shel.	Ross
Wichita, RX	2½	3,600	36x4	36x8	Beav.	4-4½x6	.....	.....	Duplx.	Strom.	Hart.	Cotta.	worm	Shel.	Ross
Wichita, O	3½	4,000	36x5	36x5d	Beav.	4-4½x6	.....	.....	Duplx.	Strom.	Hart.	Cotta.	d-rd	Shel.	Ross
Wichita, S	6	5,000	36x6	40x6d	Beav.	4-4½x6	.....	.....	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Wis.	Gem.
Wilcox, A-1	1	.....	35x5	35x5	Buda	4-33x5½	Bosch	none	Pierce	Wil-B	Own	Own	worm	Wis.	Own
Wilcox, B	1½	.....	36x4	36x5	Own	4-4½x5	Bosch	none	Pierce	Wil-B	Own	Own	worm	Wis.	Own
Wilcox, C	2½	.....	36x4	36x6	Own	4-4½x6	Bosch	none	Pierce	Wil-B	Own	Own	worm	Shel.	Own
Wilcox, E	3½	.....	36x5	36x5d	Buda	4-4½x5	Bosch	none	Pierce	Wil-B	Own	Own	worm	Shel.	Own
Wilcox, W	6	.....	36x5	40x6d	Wauk.	4-4½x6½	Bosch	none	Pierce	Wil-B	Own	B. & B.	B-Lipe	Timkn.	Ross
Wilson, F	1½	2,650	36x3½	36x5	Cont.	4-33x5	Eise.	opt.	Pierce	Marvel	B. & B.	B-Lipe	worm	Timkn.	Ross
Wilson, EA	2½	3,300	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Pierce	Marvel	B. & B.	B-Lipe	worm	Timkn.	Ross
Wilson, G	3½	4,300	36x5	36x5d	Cont.	4-4½x5½	Eise.	opt.	Pierce	Malvel	Warner	Warner	worm	Timkn.	Ross
Wilson, H	5	5,275	36x6	40x6d	Cont.	4-4½x6½	Eise.	opt.	Pierce	Marvel	Warner	Warner	worm	Timkn.	Ross
Winther, 39	1½	2,325	34x3½	34x5	Wis.	4-33x5	Eise.	Bijur.*	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Winther, 439	1½	2,575	32x4	32x4	Wis.	4-33x5	Eise.	.....	.....	Strom.	Fuller	Fuller	in-g.	Clark	Ross
Winther, 49	2	.....	34x4	34x4d	Wis.	4-4 x5	Eise.	Bijur.*	.....	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 70	3	4,100	36x5	36x5d	Wis.	4-4x6	Eise.	Bijur.*	.....	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 89	4	4,500	36x5	40x5d	Wis.	4-41x6	Eise.	Bijur.*	.....	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 109	5	5,000	36x6	40x6d	Wis.	4-41x6½	Eise.	Bijur.*	Simplx.	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 129	6	5,250	36x6	40x12	Wis.	4-51x6	Eise.	Bijur.	Simplx.	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 149	7	5,500	36x6	40x7d	Wis.	4-51x6	Eise.	Bijur.	Simplx.	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 459	2½	.....	34x5	34x5	Wis.	4-4x5	Eise.	.....	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Winther, 479	3½	4,900	36x5	36x5d	Wis.	4-41x6	Eise.	Bijur.	.....	Mast.	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 979	3½	4,250	38x7	42x9	Wis.	4-41x6	Eise.	Bijur.	.....	M'act.	B. & B.	B-Lipe	in-g.	Clark	Ross
Witt-Will, N	1	2,100	36x3*	36x4*	Cont.	4-33x5½	Eise.	.....	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timln.	Ross
Witt-Will, P	2½	3,150	36x3½*	36x4*	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Wolverine, C	1½	2,380	34x3½	34x5	Cont.	4-33x5	Eise.	G&D*	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem
Wolverine, D	2	2,650	34x4	34x3½d	Cont.	4-33x5	Eise.	G&D	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; L&P., Leloi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto, Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Ruggles, Ruggles. **Carburetor**—Schebl., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till, Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe, Brown-Lipe; Det., Detroit; Mech., Mechanics; Cover., Covert; Sav., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H., Keystone-Handley; Shel., Sheldon; Salsby, Salisbury; Ind., Industrial; Chgo., Chicago; Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

AUTOMOBILE PUBLICITY WHICH CAN BE MADE REAL NEWS

(*Concluded from page 17*)

information regarding the condition of roads in the immediate vicinity of the town in which his city is located and naturally the newspapers are more interested in local road conditions than they are in those in other parts of the United States.

Any publicity submitted along the lines of new inventions and developments must, of course, be extremely brief and be written as straight "news" without any attempt at editorialization, such as proclaiming the development "the greatest development of the year in the automotive industry." Packard scored a big success with the publicity sent out this year on its new fuelizer simply because that publicity confined itself simply to a plain statement of what the device was and what it would accomplish without the use of superlatives or extravagant claims.

New Models Are Real News

New models should be announced briefly as possible with a due regard to accuracy. I recall having received the announcement of a new model of a well known car which extended over no less than 5,000 words. Rather than have to wade through all the mess of superlatives, exaggerations and redundancies, I simply called up the local dealer and got a good description from him from which I wrote an announcement of about 100 words—the greatest amount I possibly could spare for an item of the sort.

Changes in dealerships and new salesrooms and headquarters are of less interest to the owner than to the dealers, but as newspapers have many dealer readers, a limited amount of this sort of stuff may be used. But it shouldn't be factory stuff telling some newspaper in New York about a dealer in Oskaloosa, Iowa, moving to a new salesroom. This sort of publicity is dealer publicity and the sooner the factory realizes this, the better it will be for its publicity.

MANUFACTURERS TURN TO TRUCKS

Boston, July 6.—To prevent catastrophe manufacturers are making extraordinary efforts, without regard for expense, to move goods over the roads on motor trucks. Goods manufactured to supply selling agents are pushed forward less frantically although the truck comes into play for part of the journey in effecting many shipments.

Another part of the freight tangle which reacts on New England arises from the automobile business, which has been slowed down by the inability of the railroads to deliver machines as fast as finished.

Charles H. Jones, president of the Commonwealth Shoe & Leather Company, and who is regarded by many as an authority on New England industry, in a recent review of the situation said: "As for the remedy! We have got to have the certainty of prompt and efficient transportation. This is one thing of which New England has got to be assured if it is going to resume its former position in the market."

Law in Your Business

By Wellington Gustin

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will glady answer such individual inquiries on knotty problems as may be submitted to him.

The Value of an Exchanged Car Taken in Sale

Exchange Value Not Controlling in Action for Breach of Contract

In an action of the Berkowitz Trucking Co. against the Bethlehem Truck Co. of New York, the former obtained a judgment for breach of contract by the Bethlehem Co., and the trial court allowed Berkowitz the difference between the market value of his old truck and $300 which had been fixed in the contract as its exchange value. On appeal to the Supreme Court, this was held to be an incorrect means of damage, and the judgment reversed.

Berkowitz had bought a truck for the Bethlehem Co. for $1,848.66. The seller allowed $300 for an old car of the buyer, which was to be taken in exchange. On this point the court said the Bethlehem Co. did not agree to buy Berkowitz's car for $300. The actual purchase price at which it agreed to sell its truck was $1,548.66 plus the market value of the old car taken in exchange. Now, as there was no evidence that the market value of the Bethlehem company's truck was greater than $1,548.66, no proper measure of damages upon which to base a recovery was proved by Berkowitz.

Where the Garage Keeper Loses Again

No Lien for Repairs to Automobile Leased from Owner in Pennsylvania —Knowledge and Consent of Owner for Repairs Necessary for Lien

The owner of an automobile in Pennsylvania leased same to Franklin A. Ward, the terms of the lease providing that it should be construed subject to and be governed by the laws of Pennsylvania. This provision made Ward the lessee of the car and not the owner or conditional vendee or mortgagor remaining in possession of such car. This lease was made in Pennsylvania, the car was delivered in Pennsylvania, and was to be returned to the lessor in Pennsylvania.

Possession of the car being turned over to Ward under his lease, he took the car into New Jersey and there had certain repairs and supplies made and furnished by A. B. Lane, a garage keeper. Upon failure to pay, this garage keeper held possession of the car on his claim for repairs and supplies. Now the New Jersey garage act provides for a lien where the repairs or supplies are furnished "at the request or with the consent of the owner or his representative, whether such owner be a conditional vendee or a mortgagor remaining in possession or otherwise."

The owner of the car brought replevin in New Jersey to regain possession of it, but upon trial a judgment was rendered in favor of the garage keeper, upholding his right to retain the car under his claim of lien. The Supreme Court of the state reversed this judgment, awarding possession of the car to the owner, in Pennsylvania, and denying the claim of lien of the garage keeper, and the Supreme Court's view has been affirmed by the Court of Errors and Appeals of New Jersey.

It appears that the repairs and supplies were furnished at the request or with the consent of Ward, the lessee, who was in possession of the car. The lease expressly provided that no repairs should be made without the consent of the lessor being obtained first. Under such a lease in Pennsylvania, it has been held that the lessee is not the representative of the owner for the purpose of creating a lien for repairs and supplies.

Therefore, the question of whether Ward was the owner's representative in having the garagekeeper repair the car was determined against the garagekeeper.

Injured While Replacing Tires at Roadside

Due Caution of Injured Party Puts Blame on Other Driver

The Supreme Court of Pennsylvania has affirmed a $3,000 judgment against Wm. A. McConnell and in favor of Daniel M. Reisinger for personal injuries. The latter had stopped his car near the curb in front of a public garage, for the purpose of procuring a tire left to be repaired, and was assisting in placing the repaired tire in the tire holder on his car, with his back in the direction from which McConnell's car approached. While in a stooping position, the right front guard of McConnell's car collided with the left rear mud guard of Reisinger's car, catching Reisinger between the two machines and producing serious injuries to him.

In rounding the corner into the street where Reisinger's car was standing, McConnell's machine turned to the right and continued to curve in that direction, instead of straightening, as it should have done, until it collided with Reisinger's car, which was situated just 53 feet from the street corner.

The court said Reisinger could not be held negligent, contributing to his injury, merely because of his presence and position on the street. Both himself and car were outside the direct line of traffic with ample free space for other vehicles to pass along the street in safety. He had been in the position in which he was caught for only a half a minute, and had been watchful to see whether vehicles were approaching in either direction.

REDUCE LOUISIANA TAXI FEE

Baton Rouge, La., July 6.—With an amendment reducing the annual license from $25 to $15, the Dugas bill, providing for the regulation of "for-hire" automobiles, has been favorably reported to both houses of the legislature, and will be passed in the course of routine business in a few days. The bill, which gives authority to police juries to regulate this class of motor cars in all the parishes, provides that no service vehicle shall be allowed to be overcrowded and that no chauffeur shall be given a certificate, or allowed to drive, unless he is more than 18 years old, and has passed a rather stiff physical examination.

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

Milwaukee	Annual Fall Automobile Show	Aug. 30-Sept. 4
Indianapolis	Fall Automobile Show	Sept. 6-11
Northampton, Mass.	Annual Automobile Show	Oct. 6-8
Jersey City, N. J.	Annual Automobile Show	Nov. 1-6
New York	National Passenger Car Show	Jan. 8-15, 1921
Chicago	National Passenger Car Show	Jan. 29-Feb. 4, 1921

FOREIGN SHOWS

Antwerp	Commercial Vehicles, Tractors, Trucks and Engines	June 26-July 25
London	Commercial Vehicles, Exhibition, Olympia	October
London	Passenger Car Show, Olympia	November

RACES

Warren, Pa.	Dirt Track	July 17
Watertown, N. Y.	Dirt Track	July 24
Fulton, N. Y.	Dirt Track	July 31
Paris, France	Grand Prix Race, Sporting Commission	August
Erie, Pa.	Dirt Track	Aug. 7
Buffalo, N. Y.	Dirt Track	Aug. 14
Johnstown City, Pa.	Dirt Track	Aug. 21
Elgin, Ill.	Road Race	Aug. 21
Middletown, N. Y.	Dirt Track	Aug. 20-21
Flemington, N. J.	Dirt Track	Aug. 27-28
Canandaigua, N. Y.	Dirt Track	Aug. 28
Hornell, N. Y.	Dirt Track	Sept. 6
Uniontown, Pa.	Speedway Race	Sept. 6
Syracuse, N. Y.	Dirt Track	Sept. 17-18
Allentown, Pa.	Dirt Track	Sept. 25

TOURS

New York-San Francisco	Glidden Tour	September
Milwaukee, Wis.	Annual Fall Automobile Show	Aug. 30-Sept. 4
Detroit	Good Roads Assn. Tour	July 14-29

Minnesota Registration Law Strict—Registration of automobiles with the register of deeds in Hennepin county for the first year of the operation of the law will reach 33,000. The law went into effect July 1, 1919, and on June 13, 1920, the registration had arrived at 32,927, or 17,806 since Jan. 1, 1920. The automobile registration bureau in the court house in Minneapolis is the busiest office in that structure.

The law is that every person who owns an automobile must register it if he desires to sell it or to get a license. The name of the owner and the number of the engine are registered for fifty cents. Two copies are given the registering applicant, one of which is surrendered to the state when the state license is obtained. The certificate which he retains goes to the person to whom the car is sold at any future time. If a certificate is lost, a duplicate may be obtained from the original, which remains on file.

The buyer of a car must visit the bureau and register the car under his own name, because under the law he is otherwise using another person's car and if he loses the certificate he cannot get a new one and if he wishes to sell the car he has no proof of ownership.

Inasmuch as the law is new and Minnesota registration with the secretary of state is triennial, a lot of cars in Minnesota are not yet on the books of the register of deeds. The law is expected to protect car owners against thievery. No other person can register the number, for a number can be registered only once. The result is that a person buying a used car is likely to find out before the transfer is made whether the ownership of the car he is about to buy, stands as represented with the county registrar.

Buffalo Has Plan to Prevent Car Thefts—Buffalo is planning to try out a new method of preventing automobile stealing.

The plan is to provide traffic officers stationed in the city's business district with checks. One of these would be given by the officer to each motorist parking his car in the business section. No car could be taken from its parking space, without first showing the officer the check.

It is planned to charge a fee of five cents for this service. It is believed this sum would cover the cost of placing the additional officers on this duty and would not be objected to by motorists. It is planned to give the scheme an early tryout here.

Coast to Coast in Fourteen Days

A photograph of the 3-ton Packard truck which, to demonstrate the possibilities of pneumatic tires for motor trucks made a trip from Los Angeles, Cal., to New York City, a distance of 3451 miles, in 13 days, 13 hrs. and 15 min. The best previous record was 17 days, 3 hrs. The rear tires are 44x10, the front 38x7, and inflated to 140 lbs. The total mileage of this truck to date is approximately 123,000 miles, it having made four trips in all across the United States and has traveled thirty-two states of the union